PHARMACEUTICAL HISTORIAN

Vol. 43 No. 1
March 2013

British Society for the History of Pharmacy
Q House, Troon Way Business Centre, Humberstone Lane,
Thurmaston, LEICESTER LE4 9HA

Founded 1967

https://doi.org/10.24355/dbbs.084-201802161454

British Society for the History of Pharmacy

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The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

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Promotion of historical studies related to pharmacy.
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Publication of the research work of pharmaceutical historians.
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Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

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The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.
An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.
Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*
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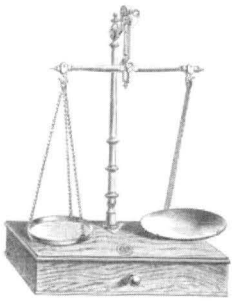

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Contents

Diary

Please note that evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated.

Monday 11 February 2013
'The Age of Empire: Pharmacy in British India 1811 to 1947' by Dr Stuart Anderson. Lambeth, 5.30pm.

Tuesday 21 May 2013
'Reflections of a Regulator' by Sir Michael Rawlins. Joint Meeting with Society of Apothecaries at Apothecaries Hall. Details for booking later.

Wednesday November 2013
Meeting at Cardiff University. Speaker and title to be confirmed.

Future dates

June 2013 Visit to be confirmed.

Monday 7 October 2013 Cardiff

Visit to be confirmed.

British Society for the History of Medicine
28 to 31 August 2013 24th Congress at Christ Church University, Canterbury, Kent.

Facebook
You can find BSHP by searching for "British Society for the History of Pharmacy" once you have logged into Facebook.

BSHP Annual Spring Conference

Friday 22 March to Sunday 24 March 2013

The Annual Spring Conference will be held at the Best Western Alicia Hotel, 3 Aigburth Drive, Liverpool, Merseyside, L17 3AA.
The price is being held at last year's level of £300 all in. The hotel is situated in the tranquil area of Sefton Park yet only minutes by car from the city centre, and Saturday afternoon will be free for you to explore the World Heritage Site or the park.
The winner of the Burnby Bursary, Sarah Trenfield, a pharmacy student from Cardiff University, will present a paper on 'Chlorpromazine and how it revolutionised the world of psychiatric drugs'.
For further details contact Shirley Ellis as soon as possible on 01223 811891 or shirleyellis@shirlellis.plus.com

Commemorative plate
Peter Dale,son of JR Dale, formerly Chief Inspector of PSGB, offers a limited edition boxed bone china plate to any member of the British Society for Pharmacy History who would be interested in possessing it. It was commissioned to commemorate fifty years of the Pharmaceutical Society's Inspectorate and is authenticated by GE Appelbe. His address is peter Dale, 9 Chisnall Road, River, Dover, Kent, CT17 0RH. Tel 01304 823217.

International Society for the History of Pharmacy

41st Congress for the History of Pharmacy, Paris,
The 41st Congress will be held from Tuesday 10 to Saturday 14 September 2013 at the Couvent des Cordeliers, Paris.
The two main themes will be the history of the history of pharmacy itself, celebrating the centenary year of la Société d'Histoire de la Pharmacie, and the bicentenary of the death of the military pharmacist Antoine Augustin Parmentier, well known for his researches on nutrition and hygiene.
Details and booking on the website: **http://www.41ichp.org**

https://doi.org/10.24355/dbbs.084-201802161454

Medical supplies for the expeditions of the heroic age of Antarctic exploration: Topical drugs

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This paper describes the drugs for topical use on the skin and throat that were taken on Scott's and Shackleton's expeditions to the Antarctic. The commonest skin problem encountered was frostbite and the use of topical preparations for the treatment and prevention of this is also discussed.

Drugs for use on the skin

On the expeditions of the heroic age of Antarctic exploration, a variety of drugs were taken for use topically on the skin and throat. Ophthalmic drugs were used topically but are discussed elsewhere.[1] The lotions, ointments, creams etc that were taken on the *Discovery*,[2] *Terra Nova*[3,4] and Imperial Trans-Antarctic (ITAE)[5] expeditions are listed in Table 1 (pp.3-4). This table also compares these drugs with those required for ships by the Board of Trade in 1906.[6]

I have divided these preparations into counter-irritants, antiseptics (preparations containing mercury, boric acid, carbolic acid and potassium permanganate), soothing preparations, and preparations used for treating disease of the skin. Obviously these categories are not mutually exclusive as antiseptics were used to treat skin infections, soothing compounds were added to antiseptics and iodine was often painted on the skin overlying musculoskeletal problems.

Topical treatments on the Board of Trade list that are not mentioned in the list of topical treatments carried are sulphur ointment, linimentum calcis (carron oil) and Friars balsam.

In addition to topical applications, medicated dressings were also taken. Those taken on the *Terra Nova* are shown in table 2.

Table 2. Medicated dressings taken to the Antarctic on the *Terra Nova*[3,4]

	Notes
Alembroth gauze	Mercuric chloride and ammonium chloride
Compressed boric wool	
Compressed boric lint	
Compressed boric double cyanide gauze	Mercuric cyanide and zinc cyanide
Iodoform gauze	

In addition to these, the Terra Nova took various other chemicals including 42 lb of magnesium sulphate and 9 lb of carbolic acid crystals. These could have had a number of uses but they also took 18 lb of Vaseline, four spatulas and two ointment slabs, presumably so that further ointment could be made from some of the chemicals taken in solid form.

Topical treatment of frostbite

The commonest skin problem on the expeditions was frostbite which, on the face, was often associated with sunburn. Minor wounds were common and although wound infections were rare, they did occur, especially those sustained cutting up seals for meat and blubber. Wounds and their infections would have been taken very seriously in the pre-antibiotic era.

The most important part of the treatment of frostbite is to reverse the freezing process but Dr Alexander Macklin (surgeon on two of Shackleton's expeditions) wrote that 'A part that does not immediately come back to normal must be kept warm and dry, and the application of a *little* methylated spirit or turpentine is good.'[7] However, if a blister forms or there is skin necrosis leading to an ulcer, this will need dressing. Dr Edward Atkinson (surgeon on Scott's *Terra Nova* expedition) wrote that 'the best treatment [of frost bite] was to empty and pare away the blisters, and to keep the parts in baths of boracic lotion, the best dressing being hazeline cream or boracic ointment.'[8]

On Scott's return from the South Pole, Edgar Evans developed severe frostbite of the fingers and Dr Edward Wilson's diary records 'Dressing Evans fingers everyday with boric Vaseline …' (a combination of boric acid and Vaseline).[9] He presumably melted snow and boiled the water to clean the wound as Roald Amundsen left a broken hypsometer (an instrument to determine the temperature at which water boiled, from which they could determine the atmospheric pressure and thus the altitude) at the South Pole and Wilson says, in his diary, 'I took away the spirit lamp of it which I have wanted for sterilizing and making disinfectant lotion of snow.'[10] Boracic Vaseline was mentioned in the list of medications taken but is not mentioned in the list of medications taken in the sledging medical cases.

Dr Jean-Baptiste Charcot, the leader of the two French expeditions of that era, recommended the use of picric acid.[11] This was a recognised treatment for burns, perhaps more in France than Britain,[12] but could also be used for other conditions.[13] 'Newskin' (collodion) was also used to dress frostbite on occasion.[14]

Substances were sometimes applied to the skin to prevent frostbite. Wilhelm Filchner, the leader of the second German expedition wrote: 'During the winter, due to the cold, it was recommended that one ceased washing and rub fat or Vaseline on one's face.'[15] On the *Southern Cross* expedition Louis Bernacchi wrote: 'Before leaving camp glycerine was rubbed on the face and hands as a prophylactic against frost-bite which …was very effective'[16] and later, on the *Discovery* expedition he complained: 'One of the problems with which everyone was struggling was the discovery of some method of protecting nose and cheeks from frostbite. I do not know why we had overlooked that excellent specific which had proved so valuable to the Southern Cross winter party, a coat of glycerine.'[17]

https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Topical treatments taken on expeditions and preparations considered essential by the Board of Trade

						Board of Trade list	
			Discovery	*Terra Nova*	IT AE	Ships without doctors	Ships with doctors
Treatment	**Other names**	**Notes**					
Counter-irritants							
Blistering fluid	Liquor epistasticus		*	*	*	*	*
Brown's sinapism		A plaster or poultice of mustard oil or powdered mustard seed.	*	*			
Camphor, spirit of	Camphorated oil	Also used internally	*				
Crotonis oil		Also used internally	*	*			
Mustard leaves	Charta sinapia		*	*	*	*	*
Turpentine oil	Oil terebithinae, Spirits of turpentine			*	*		*
Antiseptics							
Biniodide of mercury	Red mercury	Smaller doses were also used internally			*		
Borax	Sodium borate	Also occasionally used internally	*	*	*	*	*
Boric acid		Also occasionally used internally		*	*		
Boric acid ointment	Borofax is a trade name		*	*	*	*	*
Carbolic acid	Phenol		*	*	*	*	*
Corrosive sublimate	Mercuric chloride	Also used internally	*	*	*		
Glycerine of boric acid					*		
Lanoline mercurial ointment			*	*			
Magnesium sulphate		Also used internally	*	*			
Mercuric ammonia ointment	'White precipitate'	Used for various skin diseases	*	*	*	*	*
Potassium permanganate			*	*	*		
Zinc & vaseline carbolic ointment				*			
Zinc sulphocarbolate				*			
Soothing							
Gall with opium and vaseline ointment			*	*		*	*
Hazeline			*	*	*		
Hazeline cream			*	*	*		
Ichthyol ointment			*	*	*		
Lanoline			*	*	*		

Continued

https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Topical treatments taken on expeditions and preparations considered essential by the Board of Trade (*continued*)

						Board of Trade list	
			Discovery	*Terra Nova*	IT AE	Ships without doctors	Ships with doctors
Treatment	**Other names**	**Notes**					
Soothing (*continued*							
Lead acetate ointment			*	*			
Lead subacetate	Lead solution, Goulard's extract	Astringent and antipruritic. Also used on bruises and sprains	*	*	*	*	
Olive oil		Piles and burns	*			*	*
Soap liniment	Liniment saponis, opodeldoc		*	*	*	†	*
Vaseline		Also lubricant and used to keep surgical instruments rust-free	*		*	*	*
Treatment of diseases							
Belladonna plasters		Musculoskeletal pain	*	*	*		
Methylated liniment of aconite		Gout, neuralgia rheumatism	*				
Methylated liniment of belladonna		Musculoskeletal pain, neuralgia, spasms	*	*			
Iodine tincture		Skin disinfectant. Also used for musculo-skeletal pain			*	*	*
Iodine liniment			*	*		*	*
Iodoform		Ulcers and wounds	*	*		*	*
Silver nitrate	Caustic	Used on poorly healing wounds	*	*	*	*	*
Wound protection							
Burroughs & Wellcome protective skin		Probably the same as collodion		*			
Collodion			*		*		*
Court plaster			*	*	*		

† Soap liniment may be called Opodeldoc. However the list of drugs prepared by the Board of Trade describes Opodeldoc as liniment of opium.

https://doi.org/10.24355/dbbs.084-201802161454

Macklin wrote that 'Vaseline and glycerine have been used on the face to protect it from strong winds, and apparently with success,'[18] but elsewhere writes: 'It is commonly believed that fats, oils and grease are good non-conductors of heat and if placed on the clothes or on the skin help to keep one warm. There was never a greater fallacy'[7] and he counsels against. Charcot says that '*It is extremely dangerous, in very cold temperatures, to cover the face with fat*. That freezes at a relatively less low temperature, predisposing, therefore, to frostbites' an also points out that applying fat to the skin will make it more difficult to see the typical white patch of frostbite.[11]

Other conditions

Hazeline cream was a general purpose soothing cream. In addition to its use in frostbite, as noted above, it was used for sunburnt and cracked lips[19] and Ernest Shackleton says that on their boat journey from Elephant Island to South Georgia 'the insides of our thighs were rubbed raw, and the one tube of Hazeline cream in our medicine chest did not go far in alleviating our pain.'[20]

On the *Terra Nova* Northern Party, Raymond Priestley wanted to take a photograph of a cave and tried to light it with magnesium powder but 'the whole show went off in my face burning it badly, singing off my eyelids and eyelashes and blinding me temporarily. … [Dr] Levick however dressed the face with boracaine and gave me a mixture of drugs to remove the pain and in a few minutes no trace of the accident remained except the scars.'[21] I am uncertain as to what this preparation was but it sounds like a combination of boric acid with a local anaesthetic. (It cannot have been the local anaesthetic agent borocaine, which was not invented until 1925.)[22]

George Abbott, part of the same group, cut his fingers while butchering a seal and so the wounds were contaminated. Dr Murray Levick dressed them with boracic wool and the following day washed them with mercuric chloride.[23]

On the march, washing was difficult as all water had to be obtained by melting snow and fuel was limited. After the *Terra Nova* Northern party had been trapped all winter in a snow cave and had been unable to wash for that time, Levick wrote in his diary: 'I have recommended that everyone should have a wash down with hydrarg perchler [mercuric chloride] 1 in 1000 before a sledging trip.'[24]

In the Antarctic, wounds are slow to heal because of the cutaneous vasoconstriction due to the cold. Erich Drygaski, the leader of the first German expedition wrote: 'Small wounds would be slow to heal; suppuration was slight, but so too was the healing process, which Gazert [the doctor] put down partly to the absence of bacteria which otherwise irritate a wound and cause it to respond. His treatment of such wounds consisted in applying artificial irritation, by cauterising with lunar caustic [silver nitrate] and other substances, and this produced a good response.'[25]

Substances were sometimes applied to the skin to treat underlying problems. Thus in the Ross Sea Party, when Richard Richards developed scurvy and had bruising of his leg, this was rubbed with methylated spirit and when Ernest Wild sprained his ankle, 'the sprain was painted with tincture of iodine and bandaged…'[26] Similar treatment had been given over 20 years earlier on the Dundee Antarctic Whaling Expedition when an enlarged lymph node and a painful clavicle were both painted with iodine.[27,28]

I have not found any record of the use of gall and opium, belladonna or aconite but they were in the *British Pharmacopoeia* as they were assumed to have an analgesic effect. However research in 1910 stated: 'We have no hesitation in saying that none of these have any anaesthetic effect on the unbroken skin. Belladonna linaments and plasters have been ordered for generations, and glycerine of belladonna finds a place in the casualty room of most hospitals, but when tested by accurate methods they are quite unable to prevent or relieve pain except in so far as that effect may be produced by the support of any plaster, or the counter-irritation and massage obtained by the use of any simple liniment.'[29] This presumably is why they were not taken on Shackleton's second expedition which left in 1914.

Topical treatment to the throat

Topical treatment could also be applied to the throat. When Shackleton developed a sore throat, he wrote in his diary: 'coughing all night kept me awake. Gargling Condy's permanganate of Potash.'[30]

The *Discovery* and *Terra Nova* also took Tabloid 'Voice' containing potassium chlorate, borax and cocaine.

Drugs for use in the throat might be applied with a brush and the BW&Co 251 medicine chest supplied to the expeditions contained two throat brushes. While I have found no reference to the use of these in the Heroic Age literature, there are a number of references to doing this in Bruce's medical diary of the Dundee Whaling Expedition 1893-4.[28,31] Painful gums might be treated with iodine.[32]

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Acknowledgments

This research was funded by the Wellcome Trust who gave me a Short Term Research Award in the History of Medicine for Clinicians and Scientists for a study on 'medicine during the Heroic Age of Antarctic exploration'.

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Ophthalmic Dosage Forms in Medieval Persia

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Medicine and pharmacy have an old history in Persia which goes back to antiquity, and the written evidences of this fact are attributed to at least 500 BC. When Islam reached Persia, Islamic medicine received contributions from Persian scholars. Due to the prevalence of eye diseases in the Islamic empire, ophthalmology had a special place within medical knowledge. There are written evidences available today that ophthalmic dosage forms were developed and prescribed as a route of administration by Persian practitioners. In this article, various dosage forms and their general and specific preparation considerations are studied from Persia during the medieval time (9-18th centuries) based on common traditional Persian pharmaceutical and medical manuscripts. Most common ophthalmic dosage forms which are mentioned in these documents include eye drops (*Ghotoor*), ophthalmic dusting powders (*Zaroor*), ophthalmic suppositories (*Shiaf*), eye washes (*Ghasool*), eye coolings (*Barood*) and kohl formulations (*Ek-hal*). These findings reveal a part of history of pharmacy in medieval period.

Introduction

What is accepted in the Western world today is that pharmacy was officially separated from medicine for the first time in 1240 AD.[2] However the remaining manuscripts of traditional Persian medicine show that Persians differentiated these two fields long before the 13th century. The holy book of Zoroastrians *Avesta* (about 500 BC.) contains the pharmaceutical and medical concepts. These concepts had such strength that it is believed that the origin and root of the word "drug" in English is derived from the word '*darav*' in the Avestan language.[3] Persian scientists of ancient Persia pushed the knowledge forward to the medieval ages and also collected the remaining knowledge of other ancient civilisations.[4] In the early Islamic era a group of Persian scholars such as *Māsawayh* in *Jondishpour* (8th century AD) were known as pharmacists. Many pharmaceutical books in particular were written by the Persian scientists either as separate lists of a registry of drugs (*Qarabadin* books) or in medical collections as separate chapters or volumes. For example, the most significant and influential scientist Avicenna wrote his precious *Canon* (1037 AD), where in the fifth volume one can see the complete pharmaceutical formulary.[5] Various dosage forms with different routes of

https://doi.org/10.24355/dbbs.084-201802161454

administration were mentioned in those books and ophthalmic formulas are one of these dosage forms.

The history of ophthalmology and eye complications goes back to Antiquity. For example cataract operations were performed from 2457–2467 BC in Egypt,[6] some ophthalmic pharmaceutical tools such as Kohl bottles were found in Persia from 500 BC. Kohl was used as eye tonic and make-up in ancient Persia. Median Kings such as Astyages used it and in about the 6th century BC Cyrus the Great encouraged the use of kohl.[7] Ophthalmic surgeries and therapeutic approaches were applied in Greek and Roman times (1st-7th century AD)[8] and ophthalmology was a separate medical speciality in the Islamic era.[9] In this regard, ophthalmic dosage forms were one of the pharmaceutical remedies used by Persian practitioners.[10] In this study, these dosage forms and their special compounding and dispensing considerations in medieval Persia are considered and introduced to clarify pharmaceutical knowledge of ophthalmic drugs in medieval period as a part of history of pharmacy.

The research method employed in this article is based on the analysis of remaining manuscripts of medieval Persia from the 9th to 18th centuries AD, including medical and pharmaceutical textbooks from this era. The chapters containing ophthalmologic information were investigated and the data was collected, categorised and analysed.

Qarabadins, traditional pharmacopeias

Qarabadins are traditional pharmacopeias which described the preparation considerations and procedures of compound medications. They include lists of drugs, formulations or prescriptions. The arrangement of the formulary varies from author to author.[11] The earliest remaining Qarabadin is *Qarabadin-e-Kabir* which was written by *Shapur Sahl* (869 AD), a Persian pharmacist from Jondishapur Medical University.[12]

Traditional ophthalmic dosage forms

In *Qarabadin* books different ophthalmic formulations can be seen. Each dosage form was meant for a specific ophthalmic condition.[13] The most common dosage forms include eye drops (*Ghotoor*), ophthalmic dusting powders (*Zaroor*), ophthalmic suppositories (*Shiaf*), eye washes (*Ghasool*), eye cooling (*Barood*) and kohl formulations (*Ek-hal*).[14,15]

In *Qarabadin* books *Ghotoor* are defined as liquid dosage forms meant to be applied in body cavities and orifices; these were in the form of solutions, emulsions and suspensions.[16]

Zaroor are solid dosage forms which were defined as dusting powders which have the finest particle size amongst the ophthalmic dosage forms.[13] These were meant to be applied in the eye or on skin cuts and wounds they were said to have shelf life of one year.[13] In a few *Qarabadin* books these powders were given mixed with liquids or honey prior to use.[13]

Shiaf are defined as solid dosage forms which were prepared in biconvex shape and were meant to be applied in the rectum or they were storage forms of an ophthalmic preparation. In the latter case the solid dosage form of suppository was prepared to increase the shelf life of the product and to provide easier transformation. At the time of application each suppository was triturated in a suitable mortar with a specific liquid to make a solution or suspension form.[16,17] The binder in these formulations would differ according to the kind of disorder the medication was meant for.[13]

Ghasool were liquid dosage forms formulated for washing body parts, including the eye.[13] The word *Barood* means cooling and these are the dosage forms meant to cool the eye s well as skin cuts and wounds due to the presence of cooling agents such as camphor in the formulation.[14,18] Later, traditional practitioners added other ingredients to this formulation to make a formulation suitable for other ophthalmic disorders.[13]

Kohl is a solid dosage form which mostly is considered as a cosmetic in today's practice. However it has been administered for medicinal purposes since antiquity in traditional pharmacy.[19,20] *Kohl* was applied in the eyes or on eyelids by means of an eye stick. It was meant for the eye to be exposed to the medicine several times unlike the *Zaroor* which is a single dose.[15] The material which the eye stick was made of was different according to the ophthalmic disorder; it mainly was made up of gold or silver (Fig. 1). And the time of the day when *Kohl* was applied had special rules as well.[21]

Figure 1. Silver kohl bottle, Zandieh period (1750–1794), Museum of Shiraz University of Medical Sciences.

General considerations in traditional eye formulations

In *Qarabadin* books special considerations are mentioned for ophthalmic preparations, even the timings. The best time in which ophthalmic preparations should be prepared was in the early spring and for *Zaroor* the late spring was also accepted since the ophthalmic medicine prepared at these times was considered to have a longer shelf life.[21] Ingredients used in these medications were mainly obtained from natural sources that included minerals, stones, sea shells, herbs and animal parts. In all cases the ingredients needed to be powdered and passed through the finest sieves to prevent possible injuries to the eye due to the presence of foreign matter. If deeper penetration of the medicaments was required then the particle size would have been reduced even more. It is noted that herbal ingredients should be obtained from fresh herbs containing no dust and or impurities. If the ingredients needed to be dried they should be dried in shade.[21] As mineral medicaments such as copper, silver, ruby and pearl were used in eye formulations it was believed that these

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medicines needed special modification called *Tadaabir* before application. In this regard, modifications included washing, burning and reduction in particle size.[22] In the washing process the drug had to be dispersed thoroughly in a liquid. The supernatant was collected and the cake was washed with the liquid once again. Washed material was separated from the liquid phase and stored after drying.[23]

Occasionally to achieve what is called today 'sterility', the ingredients were burnt. In recent research it was shown that a traditional ophthalmic formulation of Kohl which included burning the medicaments during its preparation called *Kohl Al-Ethmed* was not contaminated with any organisms and had no effect on bacterial growth.[24] Besides achieving sterility, burning (*Ehragh*) was meant to alter the nature and the chemistry of the ingredients of ophthalmic preparation. A few ingredients needed to be completely milled before burning, a few others did not need particle size reduction prior to burning, or burning was a way of reducing their particle size.[13] Washing was then performed after this process if changes in the nature of the burnt substance were needed. In some cases the medicaments were only subjected to fire and not burnt thoroughly.[23] In ophthalmic formulations, as well as the active components various other drugs have been used either as excipients or as means of reduction or increasing the potency of the main ingredient. Ophthalmic medicaments were often soaked in verjuice (*Vitis vinifera* L.) [sour grape juice], rainwater, anise juice (*Pimpinella anisum* L.), tanner's sumac (*Rhus coriaria* L.) and marjoram water (*Origanum majorana* L.) and then dried and molded to increase their effect.[14] Some special ingredients such as musk were mixed with the main components as supplier or tracer. These ingredients were used to enhance the main component.[21]

Conclusions

For medieval ophthalmology, an extensive literature is available. The detailed explanations of the skilful diagnosis and treatments show the importance of this field in the medieval medicine. Various ophthalmic formulations were used in medieval Persia from the 9th–18th century AD. Although the number of ophthalmic formulations increased during the period the dosage forms remained the same. As there were formulations which were repeated in several *Qarabadins* during this time, it is unlikely that adverse or toxic effects following the use of these formulations would not have been noticed or neglected and it is not possible that the formulations would have been used continuously throughout the history with no therapeutic effects. Accordingly the pharmaceutical validity of ophthalmic formulations in the medieval period cannot be denied.

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https://doi.org/10.24355/dbbs.084-201802161454

The Treatment of Scabies in Ferrara (Italy) in the 19th Century

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This work represents a continuation of our efforts to highlight the therapeutic approaches used in Ferrara in treating the typical illnesses of the 19th century such as tuberculosis, scrofula, syphilis and cholera. We describe approaches used against scabies, the remedies reported in Campana's *Pharmacopoeia ferrarese* as well as the other efficacious treatments employed in Ferrara in the 19th century. One of the most renowned remedies, *Pommade d'Helmeric*, is still used today.

Introduction

Tuberculosis, scrofula, syphilis and cholera, were typical 19th century illnesses, and we examined recently the approaches in use in Ferrara.[1-5] In this paper we have investigated the remedies and the treatments employed in Ferrara against scabies, an illness of great concern for the public health of the time.

We have chosen Campana's *Pharmacopoeia* as a good example to help us understand how the treatments, remedies and cures improved over the century. Antonio Campana (1751-1833), professor of Pharmaceutical Chemistry and Botany, wrote a successful pharmacopoeia for the apothecaries in Ferrara, that was also used in several Italian editions and abroad from 1798 to 1851.[6,7] The remedies for scabies adopted in the city were in line with those utilised in other countries.

The Statistical Report from St Anna Hospital, compiled by Alessandro Bennati in 1871 and 1876, [8,9] provides detailed and complete information about the treatments for scabies used in Ferrara.

The sulphur remedies and the *Pommade d'Helmeric*

Scabies is a contagious skin disease caused by the mite *Sarcoptes scabiei.* The parasitic aetiology of scabies was documented by the Italian physician Giovanni Cosimo Bonomo (1666-1696) and by Giacinto (or Diacinto) Testoni (1637-1718), an apothecary in Livorno.

The use of sulphur against scabies had been well known for millennia. Reginald Campbell Thompson in *The Assyrian Herbal* (1824) reported the translation of inscriptions on Assyrian Babylonian tablets: against the scabies, an ointment made of sulphur and citron oil was recommended.[10] In the *Ricettario fiorentino*[11] (1789) *unguento da rogna*, [scabies ointment] an ointment made of bay leaves, lard, and flowers of sulphur is reported. The use of sulphur was frequent in the Ferrara pharmacopoeias.

In the 1725 *Pharmacopea ferrariensis*[12] Francesco Maria Nigrisoli described three *unguentum ad scabiem* (two were made of sulphur): storax, lead, sodium chloride, lemon; storax, turpentine, lemon, sodium chloride, sulphur powder; *unguento rosaceo* (made with rose petals), butter, sulphur, *olio di tartaro* (potassium carbonate).

In the first edition of Campana's *Farmacopea*[6] two formulas were already present: *unguento da rogna con zolfo*, an ointment made of olive oil, lard, sulphur powder, lime, and sodium chloride, and *unguento da rogna con tabacco*, an ointment made of sulphur powder, tobacco, white hellebore (*Veratrum album)*, *maro* (cat thyme, *Teucrium marum)*, *nerio - Nerium oleander*, sodium chloride, and *unguento rosato* (made with rose petals).

In the 1841 edition[7] *acqua di Hartmann verde* was a new entry. Infusion of *fiori di zolfo* (flowers of sulphur), *allume crudo polv.* (aluminium sulphate), *verderame di Marsiglia* (copper acetate) and acetic acid were applied externally.

Pommade d'Helmeric was very successful in the 19th century, and was also used in medical practice in Ferrara. In the *Revue médico-chirurgicale de Paris*[13] of 1851 Burdin, a physician at Groningen's military hospital, refers back to Helmerich and his secret *pommade* :

> Le Journal de médecine, chirurgie et pharmacie (février 1813) contient le Mémoire de M. Burdin sur le traitment rapide de la gale [scabies], comminiqué par M. Percy. M. Burdin, médecin de l'hôpital militaire de Groningue en 1812 rapportait qu'un Hollandais, Helmerich, chirurgien an 125° régiment de ligne, était possesseur d'une pommade (qu'il tenait secrète) avec laquelle on pouvait guérir la gale en moins de quarante-huit heures.

The Dutch Helmerich, a French army surgeon, became famous for a pomade which was able to cure patients of scabies in 48 hours. The *Dictionaire des sciences médicales*[14] (1816) gave more details of the fatty sulphurous pomade with prompt effects. It was less adherent to clothing and could be washed out. It said he kept the formula secret out of amour-propre rather than cupidity since it was already known in Germany. Burdin had analysed the pomade, which he found was similar to one described by Fox,[14] which could well have been known to Helmerich. The same was reported also in the 1827 *Bulletin des sciences médicales*:[15]

The *Pommade* was well known and praised also in Italy, London, Dublin and Paris. The *Pommade d'Helmerich* is cited in *The Cyclopaedia of Practical Medicine*[16] (London, 1834):

> M. Helmerich, a French army surgeon, became famous for a method of using sulphur which cured …

and in *A practical treatise on diseases of the skin*[17] (Dublin, 1852):

> … present day in France, and found to be more efficacious than when used alone: the combination was first introduced by M. Helmerich, and the ointment, which is called after him, Pommade d'Helmerich, is composed of two parts of sulphur, one of carbonate of potash, and eight of lard. The surface of the entire body, but more particularly of the affected parts, should be first washed well with a strong solution of soft soap, the patient then placed for a quarter of an hour in an alkaline bath, containing a pound of the carbonate of potash to twenty gallons of water, at the temperature of 92°, the skin well dried, and this sulphuro-alkaline ointment afterwards thoroughly rubbed in; the disease may thus be effectually cured in two or three days, a single friction, preceded by the alkaline and saponaceous bath, being used daily.

Omodei in the 1827 *Annali universali di medicina*[18] and Soresina in the 1867 *Giornale Italiano delle Malattie*

https://doi.org/10.24355/dbbs.084-201802161454

veneree e delle malattie della pelle[19] stated that the addition of *sapone nero* (soft soap, made with potash and various animal and vegetable fats) allows the resolution of disease in 12 or 24 hours. The method reported in *Archives génér. de med. Avril. 1827* is also mentioned.

The pomade was much used in the 19th century and many physicians strove to make improvements, such as: Dupuytren's lotion; Jadelot's liniment; Holmboe's treatment; unguentum sulphurus compositum of the *London Pharmacopoeia* (containing sulphur, soft soap, nitre, veratrum, oil of bergamot, and lard); the preparation made of sulphuretted potash (sulphur and carbonate of potash) of the Dublin and Edinburgh Pharmacopoeias; Hardy's treatment; sulphuret of calcium of Vleminckx in Belgium; and so on.[20-27]

At the Hospital St Louis of Paris, ointment (*Pommade d'Helmerich*) was employed[28] (Figure 1):

> some patients having an insurmountable dislike to sulphur, were induced to try several ointments prepared with essential oils – as those of lavender, thyme, rosemary, &c., and likewise turpentine and mercurial ointment. None of these were effectual.[23]

Figure 1. Scabies dermatosis, table 55, *standard or vesicular mange.*[28]

In England scabies was more prevalent amongst the middle and upper classes; the increase is attributable to the introduction of the disease into a better class of society by the return of the army from the Crimea, but the hypothesis was unconfirmed.[24,25]

The Ferrarese Pharmacopoeia

A larger variety of remedies was proposed in the 1841 edition of *Farmacopea ferrarese*[7]. The first was scabious (*Scabiosa arvensis*), then cat thyme (*maro*) (*Teucrium marum*), *lupino* (*Lupinus albus* as flour, washing), fumitory (*Fumaria officinalis*), wild rosemary (*Ledum palustre,* decoction), *nerio - Nerium oleander* (ointment made with oleander leaf powder), *alloro - Laurus nobilis* (laurel, leaves decoction), *olio volatile di trementina* also called *olio etereo di trementina* (turpentine essential oils), *catrame* (wood tar), chlorine, *spirito di zolfo* (sulphurous acid, baths), and *fiori di zolfo* (flowers of sulphur).

In addition to the previously cited sulphur remedies (*unguento da rogna con zolfo*, *unguento da rogna con tabacco* and *acqua di Hartmann verde*) Campana included *acqua contro la rogna* also called *acqua antipsorica* (decoction; dried leaves of tobacco and sodium carbonate; frictions, twice a day). It does not smell or stain.

Campana cited three sulphurous mineral springs: *acqua di Voltri nel Genovesato* (*della Loira* near the river Loira and *della Penna* that emerged in Mount Penna) and *acqua di Rapolano* somewhere around Siena (warm spring).

Alessandro Bennati's Reports of the St Anna Hospital (1871, 1876)

The 1841 Edition of Campana's *Pharmacopoeia* and the Statistical Reports from St Anna Hospital, compiled by Alessandro Bennati in 1871 and 1876,[8,9] helped to guide us in researching these treatments.

In 1871 St Anna Hospital Medical and Surgical Division had rooms with 400-500 beds. *Sala Nuova* also called the *Sala Chirurgica* (new room, surgical room), was next to the hall of the hospital and it was reserved for critically ill patients and those unhealthy with fetid exhalations and scabies. In 1871 a Medical-Surgical Dispensary was opened. Poor persons were treated free of charge. It was open every day for out-patients. Those patients with contagious scabies were kept in.

In the Report those admitted and discharged with scabies were reported for each month: 25 males and 25 females (Table 1). Good weather was considered favourable to scabies. In the Report a chapter is entirely devoted to bathing treatment (*Cure balnearie*) (Figures 2, 3).

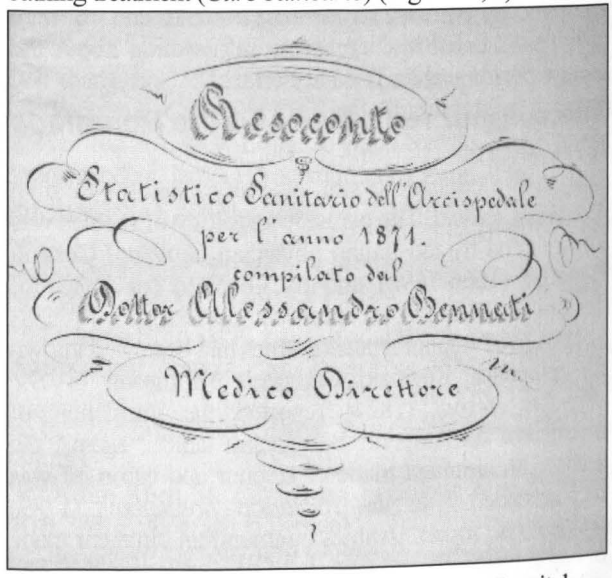

Figure 2 Statistical Report from St Anna Hospital: *Resoconto statistico Sanitario dell'Arcispedale per l'anno 1871.*[8]

In 1871 50 scabies patients (Table 2) were hospitalised (14 males and 16 females in January-June and 11 males and 9 females in July-December).

https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Numbers of scabies patients at St. Anna Hospital in 1871.[8]

	Admitted		Discharged		Days of hospital stay
Month	M	F	M	F	
January	1	1	0	0	15
February	3	6	3	7	129
March	5	2	5	2	96
April	3	6	1	3	48
May	0	1	3	4	169
June	4	1	2	0	62
July	0	1	2	1	38
August	4	3	2	4	61
September	2	0	2	0	34
October	0	1	2	0	10
November	3	2	2	2	42
December	0	1	1	2	25
	25	25	25	25	729
	50		50		

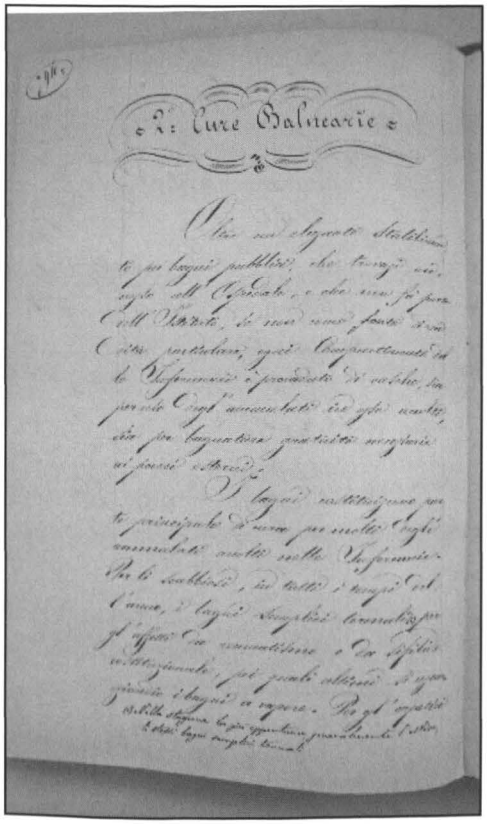

Figure 3. St. Anna Hospital, bathing treatment, *Cure Balnearie*.[8]

In January-June 14 males (not yet in an advanced state) who were treated with Helmerich's ointment and saponaceous baths, left the hospital after 6-8 days; 6 patients, treated externally with sulphur, were healed in 20-30 days. One decided to leave the hospital. In July-December 6 males (not yet in an advanced state) left the hospital after 6-10 days; 5 patients with pruriginous complications left in 20-30 days with the same treatments.

Table 2. Scabies patients hospitalised in St. Anna Hospital (Statistical Report, 1871).[8]

	Male wards			Female wards		
	Simple scabies	?Crusted scabies	Total 1871	Simple scabies	?Crusted scabies	Total 1871
Jan-June	8	6	14	9	7	16
Jul-Dec	6	5	11	6	3	9
			25			25

In January-June 9 females (not yet in an advanced state) left the hospital after 8-10 days, 7 with prurigo after 2-5 weeks; seriously affected patients were treated internally with magnesia powder and sulphur. Three decided to leave the hospital. In July-December 6 females (not yet in an advanced state) left the hospital after 8-10 days; 5 patients with chronic scabies and prurigo in 14-16 days with sulphureous baths in addition.

In summary, patients were treated with Helmerich ointment, saponaceous and general baths. In an advanced state of illness with prurigo, magnesia powders and sulphur were administered internally. Sulphureous baths were employed. These patients left the hospital after 6-30 days.

In the 1876 *Rendiconto*, a concise report of Bennati, it was reported that cases decreased from 54-60 (before 1871) to 48 (1876) (Figure 4). Four months' data were reported (Table 3): 25 males and 23 females were healed after 10-11 days. The same treatments were adopted: general and saponaceous baths and Helmerich ointment.

Conclusions

The treatments and hygienic rules adopted in 19th century in Ferrara were efficacious: in 1871 among 72,447 residents only 50 cases of scabies were registered.

Scabies remains one of the commonest of skin diseases seen in developing countries. Nowadays in Italy, scabies has reappeared perilously in some families, particularly

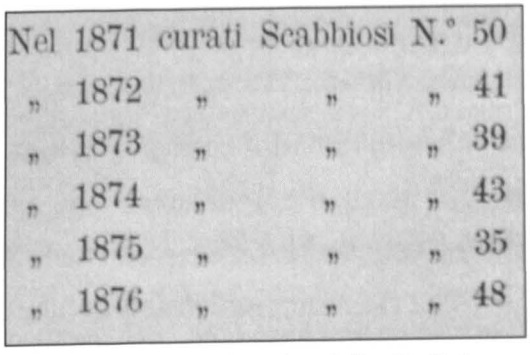

Figure 4. Scabies patients hospitalised in St Anna Hospital. (Statistical Report, 1876.)[9]

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Table 3. Inveterate scabies patients hospitalised in St. Anna Hospital (Statistical Report, 1876)[9]

	Male wards	Female wards	Total 1876
Jan-Apr	12	10	22
May-Aug	9	11	22
Sep-Dec	4	2	6
Total	25	23	48

the most vulnerable, in communities, and in hospitals, and also has its greatest impact on young children. Permethrin, crotamiton and benzyl benzoate are employed. It is thus no surprise that the *Pomata di Helmerich* is included in the 12th Edition (2008) of the *Italian Pharmacopoeia*[29]. However, with a few notable exceptions, it remains largely neglected as an important public health problem[30].

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https://doi.org/10.24355/dbbs.084-201802161454

Porcupine Stones

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Bezoar stones are masses of undigested organic and inorganic material, often within calcareous concretions, formed within the gastrointestinal tract. Introduced into Europe from the Arabic medical tradition at the time of the Crusades, the name comes from the Persian word, *padzhar*, which literally means 'antidote'. As early as the tenth century, the materia medica of Abu Mansur Muwaffak, compiled between 968 and 977 AD, commented on the bezoar, classifying it as a precious stone.[1] Different varieties of bezoar were recognised even at this early date; gathering information from a series of earlier authors, Al-Biruni (973-1048) describes at least five types, some of which may have been of mineralogical rather than animal origin, noting that they came predominantly from India and China.[2] Bezoar stones, although quite rare, enjoyed a great deal of popularity as an alexipharmic (antidote to poison).

The European Age of Discovery during the fifteenth and sixteenth centuries helped to establish trade routes to support

Figure 3. Portrait of Caspar Bauhin (1560-1624) who first named *Lapis Malaccaensis* in 1613. Engraving from around 1600-1605. Title page of *Appendix ad Theatrum Anatomicum*. Reproduced by kind permission of the Wellcome Library, London.

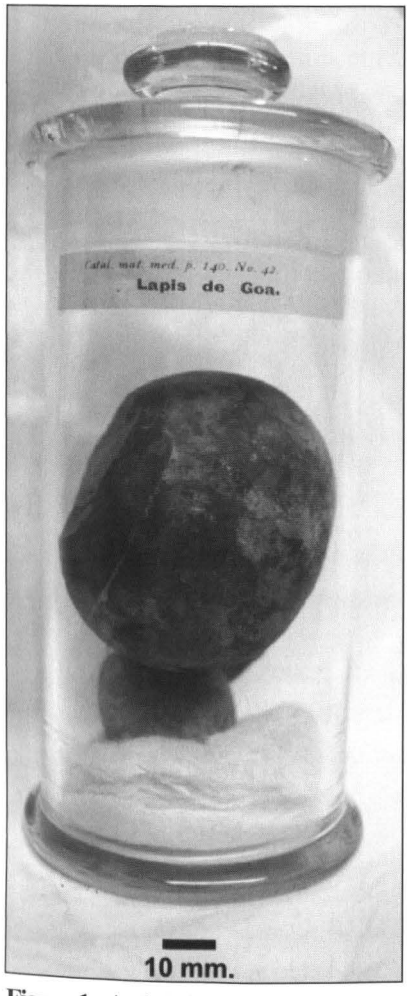

Figure 1. Authentic *Lapis de Goa*. Two specimens from the collections of the Royal Pharmaceutical Society Museum (POS FML 1).

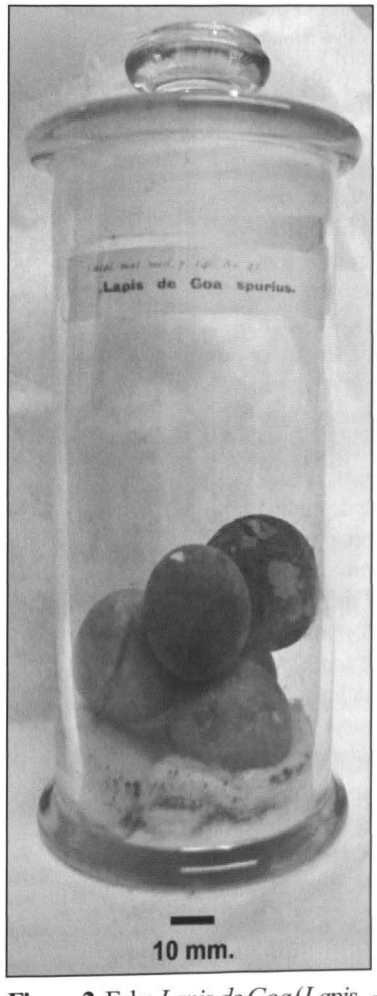

Figure 2. Fake *Lapis de Goa* (*Lapis de Goa Spurius*). Royal Pharmaceutical Society Museum (POS FML 2).

a rapidly growing home market for exotic goods, including many plants, animals and minerals which were believed to have therapeutic properties. The English, Dutch, Spanish, Portuguese, and Italians vied for dominance in the ever expanding trade between Europe and India, China and South East Asia, including the Spice Islands or Moluccas. The estab-lishment of settlements, trading posts, and missionary programmes all helped to secure footholds in the trading areas.

Bezoar stones steadily increased in popularity. Garcia de Orta (1490–1568), a Portuguese Jewish physician and naturalist who studied medicine in Spain, fled his home country for fear of the Inquisition, sailing to India as Chief Physician to the fleet of Viceroy Martim Afonso de Sousa (circa 1500-1571); he eventually settled in Goa. Here, he published his famous *Colóquios dos simples e drogas he cousas medicinais da Índia* ('Conversations on the simples, drugs and medicinal substances of India') in 1563. In the seventeenth Colloquy, he states:[3]

> But the best medicine of all is three grains of bezar stone, which the Persians call pazar. It is of such use that it almost miraculously dilates the powers of the heart. I have had many patients who said to me after taking it, not knowing what it was, that the

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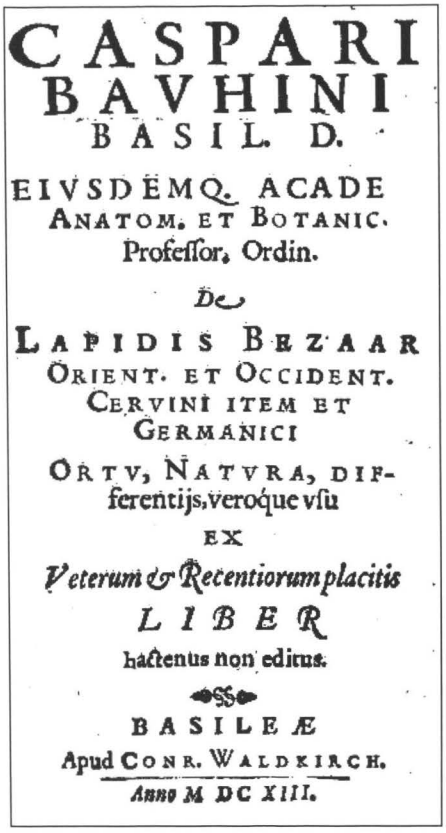
CASPARI
BAVHINI
BASIL. D.
EIVSDEMQ. ACADE
ANATOM. ET BOTANIC.
Profeſſor. Ordin.
De
LAPIDIS BEZAAR
ORIENT. ET OCCIDENT.
CERVINI ITEM ET
GERMANICI
ORTV, NATVRA, DIF-
ferentijs, veroque vſu
EX
Veterum & Recentiorum placitis
LIBER
hactenus non editus.
BASILEÆ
Apud CONR. WALDKIRCH.
Anno M DC XIII.

Figure 4. Title page of Bauhin (1613). Google Books.

medicine they had eaten had given them renewed force, and made the soul return to the body.

As demand for this miraculous stone soared, the sources of supply came under pressure. Fake bezoars began to flood the market; one response was the invention of the *Lapis de Goa* by the Portuguese Jesuit, Gaspar António, working in Goa (Fig. 1).[4] Even these were open to fraud, the carefully blended plant and animal products and comminuted precious stones overlain with polished gold leaf being replaced by coarse pebbles of fine sandstone (Fig. 2). Another response was diversification; a series of bezoars from a wide range of animals was identified and began to appear on the open market by the late sixteenth century. Indeed, the situation had progressed so far by the early 1600s that Bezoar stones were ripe for a review. The task fell to Caspar Bauhin (also known as Gaspard; 1560-1624; Fig. 3), a famous Swiss botanist whose family fled to Switzerland from France when his father converted to Protestantism. Caspar studied medicine in Italy and Germany before returning to his hometown, Basel, in 1580, eventually holding professorial positions in anatomy, botany and the practice of medicine, as well as being city physician and rector of the university.[5] In 1613, Bauhin published his *De lapidibus Bezaar Orient. Et Occident* (Fig. 4), touching on innumerable alexipharmic materials in the course of his discussion. Here, he also introduces *Lapis malaccensis*, the Porcupine Bezoar.[6]

The Porcupine Bezoar

Specimens

I recently came across two specimens of Porcupine Bezoars in the collections of the Royal Pharmaceutical Society Museum. The specimens form part of an eighteenth century collection of Materia Medica which was presented to the Museum by the Royal College of Physicians in 1926. The collection was originally made by John Burges (1745-1807), a Londoner who studied at Westminster School before going up to Oxford, where he gained BA (1764), MA (1767), MB (1770), and MD degrees (1774). Appointed Physician to St George's Hospital, his rather delicate health precluded his entering general practice and led to a rather quiet existence living with his two unmarried sisters in Mortimer Street, Cavendish Square. His great passion was the collection and study of materia medica, aided by Sir James Bland Burges (1752-1824), author, barrister, Member of Parliament for Helston and eventually Knight Marshal for George IV. John was sufficiently well known in his day to warrant a caricature, dated 1795 (Fig. 5).

Burges left the collection to former pupil Dr Everard Augustus Brande (1746-1834), originally from Mecklenburg in Germany, who later became naturalised, opened a shop at Kew and rose to serve as Apothecary to Queen Charlotte from 1783-1801. He, in turn, presented it to the Royal College of Physicians in 1809.[7]

One item in the collection (1013) is labelled *Lapis hystricis*. Stored in a sealed glass jar, it consists of a dark, oval, somewhat granular ball measuring around 25 mm in length (Figs. 6A-C).

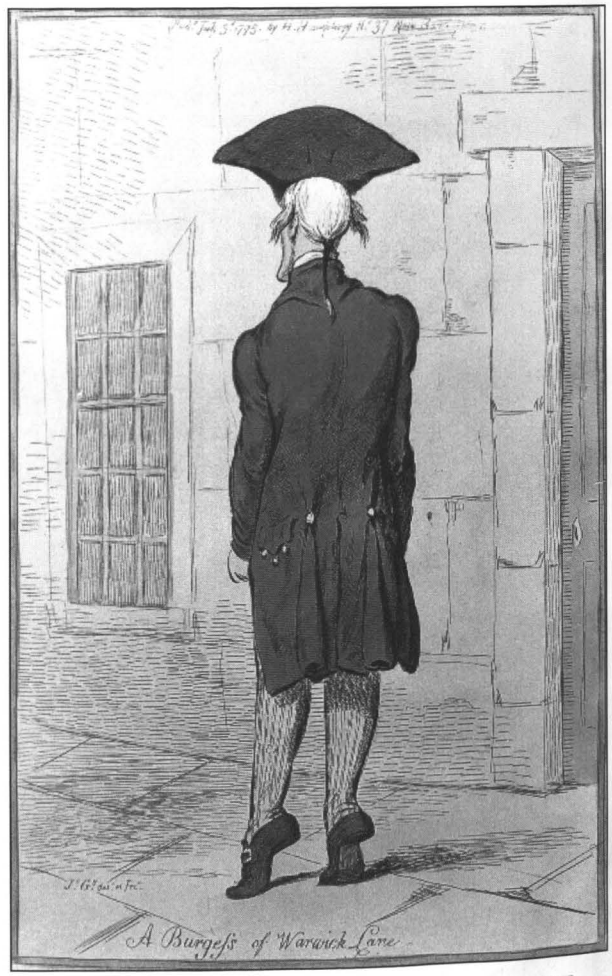

Figure 5. Caricature of Dr. John Burges (1745-1807), standing on tiptoe outside a building in Warwick Lane. Coloured etching by J. Gillray, 1795. Published by H. Humphrey, 37 New Bond Street on 3rd July 1795. Reproduced by kind permission of the Wellcome Library, London.

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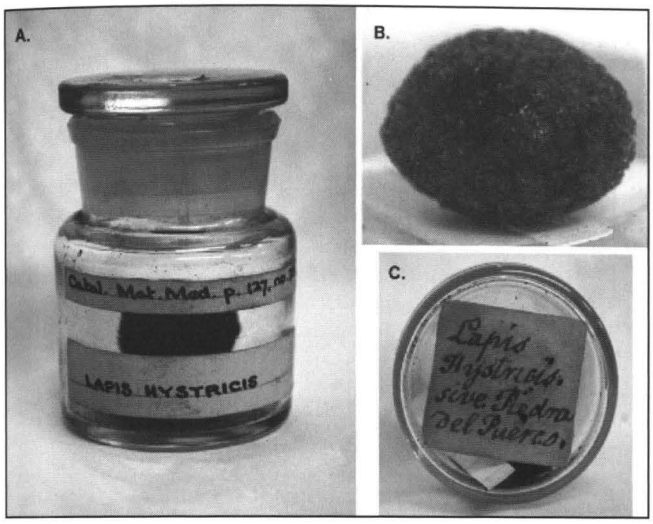

Figure 6. *Lapis hystricus* from the John Burges eighteenth century materia medica collection (Royal Pharmaceutical Society Museum, 1013) (A) specimen jar with label facing forward; (B) *Lapis hystricus* (photographed through specimen jar); (C) specimen label contained in jar.
By kind permission of the Royal Pharmaceutical Society Museum.

The second of the two specimens (POS FAP 2; Fig. 7) is the most interesting. It consists of two almost spherical, light fawn and grey to iron grey, mottled, relatively smooth balls measuring around 30 mm in diameter. Both stones are heavily fissured. Each stone is enclosed in a metal (silver?) cage. Each cage consists of two series of regular, deep petaloid loops radiating from the poles toward the centre of the stone. The two loop series are connected together in the equatorial region of the stone by means of a metal wire. At the bottom pole of the stone, the loops have their bases anchored together by means of a stud consisting of a group of small metal beads. At the top pole, the bases of the loops are connected together at a metal loop to which a metal chain is attached, anchoring the two stones together to form a single unit.

It seems clear that the open metal cagework was to allow circulation of the surrounding fluid around the stone during its use as an infusion, and to allow a route for the bitter chemicals to leach out of the stone into the surrounding medium. The chain was a useful means of suspending the stone. A second stone could be seen as a handy replacement if the first began to lose its efficacy.

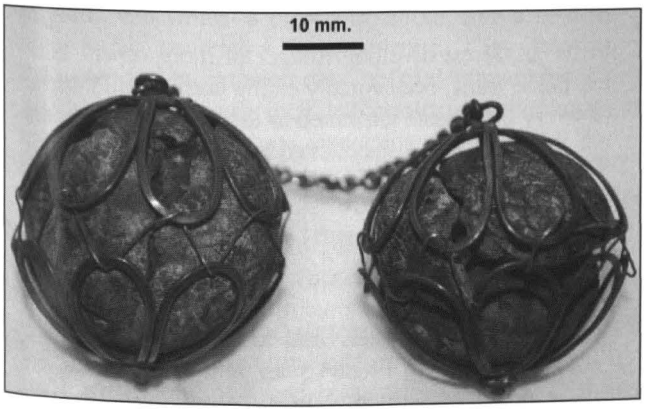

Figure 7. Two *Pedra de Porco* from the John Burges eighteenth century materia medica collection (Royal Pharmaceutical Society Museum, POS FAP 2).

The only other images of mounted Porcupine Bezoars of which I am aware are found in Engelbert Kaempfer's (1712) *Amœnitatum exoticarum politico-physico-medicarum fasciculi V*,[8] and Albertus Seba's *Locupletissimi rerum naturalium thesauri accurata* description, published in four parts from 1734 to 1765.[10] Kaempfer (1651-1716) was a German naturalist and physician who joined the Dutch East India Company as chief surgeon in 1685. He travelled extensively, later becoming known as 'The Humboldt of the seventeenth century'. He spent nine months in Jakarta (September 1689 to May 1690) before travelling on to Japan. It was probably during his stay in Indonesia, studying local natural history, that he obtained the specimens illustrated in his book (Fig. 8). He pictures a mounted Malaccan Porcupine Stone (*Pedra de porco vera sive lapis histricus*; fig. 1 of Kaempfer), two spurious Porcupine Stones from Sri Lanka (Kaempfer's figs. 2, 3) and a pig hairball (*bolus pilosus porcinus*; Kaempfer fig. 4). The Porcupine Stone is enclosed in a simple cage comprising four metal bands. It was suspended on a length of chain with a ring at either end.

Born in Etzel, East Frisia (NW Germany), Albertus Seba (1665-1736; Fig. 9) travelled widely through western Germany and Holland, studying to become an apothecary. Eventually settling in Amsterdam in 1699, he

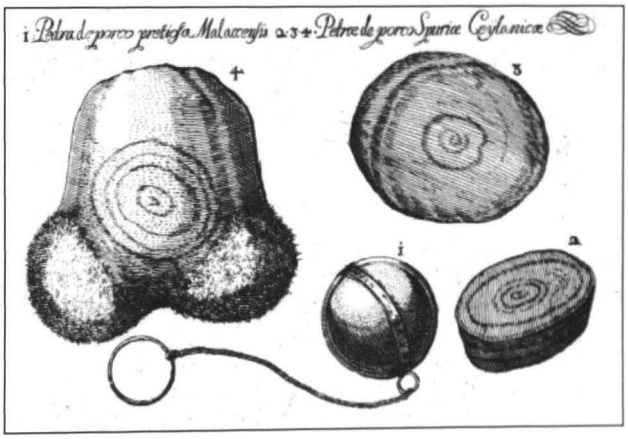

Figure 8. Figures of Porcupine Stones from Kaempfer 1712.[8]

became a wealthy man from his pharmacy business, and was a prominent citizen of the town. Seba developed an interest in natural history and began collecting specimens for his personal cabinet. Since his pharmacy was situated close to the harbour, he was able to garner many exotic specimens for his rapidly increasing collection. He reputedly sold his first collection to Tsar Peter the Great (1672-1725) in 1717 (for 15,000 guilders), and immediately commenced accumulating a second.[9] The beautifully illustrated catalogue of his cabinet, the final two parts of which were published posthumously, contains illustrations of the porcupine believed to give rise to the stones, and a number of porcupine stones themselves (Fig. 10).[10] The stones which he figures come

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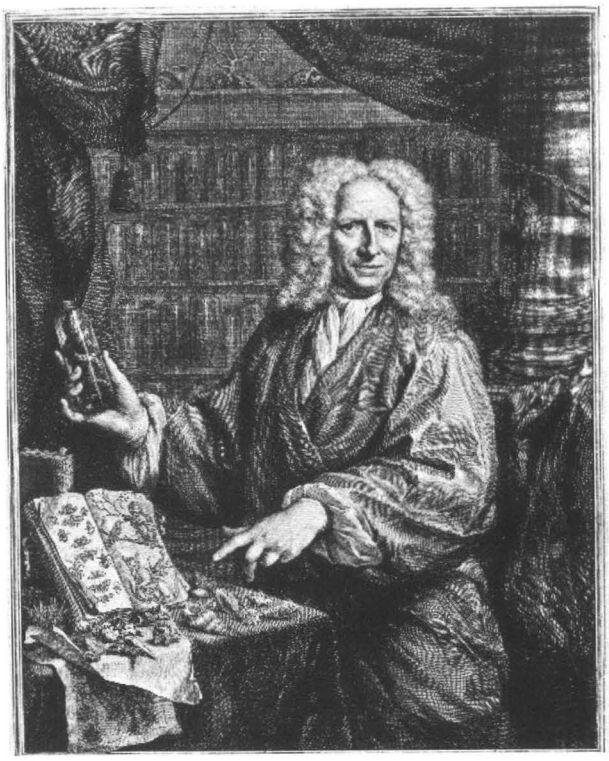

Figure 9. Portrait of Albertus Seba (1665-1736) by Houbraken after Quinkhard.

Reproduced by kind permission of the Wellcome Library, London.

from Malacca (called *Koelida Laudac* by the Dutch at the time). One specimen (his fig. 5) is unmounted, and has a spherical shape with no surface detail. Two others (Seba's figs. 3 and 4; Fig. 10) are mounted in a similar style to the Royal Pharmaceutical Society Museum specimen. The stones are somewhat oval in outline and the enclosing metal cagework consists of two groups of petaloid bands, one at either end, with several long connecting struts, each bearing a small floral decoration, running between them. One end of the specimen has a metal stud, whilst the other is characterised by a metal ring to which a chain is attached.

In terms of other surviving specimens, I am only aware of one extant Porcupine Stone which is in the Boerhaave Museum collection in Leiden. A single stone enclosed in a gold filigree case of similar style to that figured by Seba is illustrated in Fig. 11.

Sources of the stone

The porcupine stone was probably obtained from three species of porcupine endemic to the Malay Peninsula,

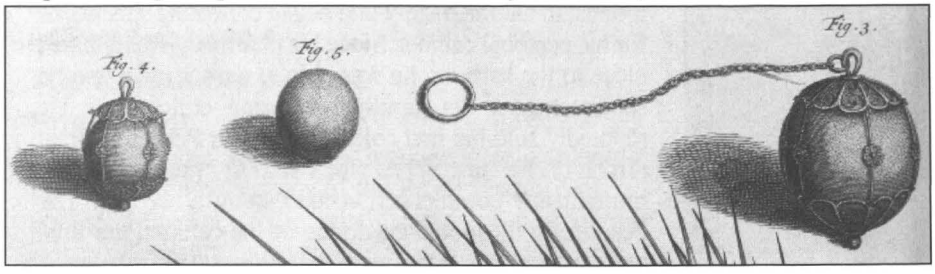

Figure 10. Porcupine Stones (figs. 3-5). Detail of Seba (1765), vol. 1, Plate LI.

Figure 11. V23789, a Pedro del Porco encased in a gold filigree cage.

Reproduced by kind permission of the Museum Boerhaave, Leiden.

Borneo and Sumatra during the sixteenth to eighteenth century; the Common Porcupine (*Hystrix brachyura* Linnaeus 1758; Fig. 12), the Long-tailed Porcupine (*Trichys fasciculata* (Shaw, 1801) and the Thick-spined Porcupine (*Thecurus crassispinis* Gunther 1876). All three have been found to yield bezoars today.[11] *Hystrix brachyura* ranges throughout South and South East Asia and is classified as vulnerable by the IUCN. It is a

Figure 12. Common Porcupine (*Hystrix brachyura* Linnaeus 1758).

nocturnal, forest dwelling forager of roots, tubers, bark and fallen fruits, occasionally eating carrion and insects. The very bitter taste attributed to the Porcupine Bezoars is believed to come from the sap of the liana, *Leuconotis anceps* Jack, 1825, which the rodents also eat.[12]

Garcia da Orta refers in his 58th Colloquy to a stone which 'is a clear vermilion. It is bitter to the taste, and to the touch it is like French soap' and is formed in the porcupine's skin.[13]

Considerable confusion seems to have arisen regarding the origins of the Porcupine Bezoar. Pierre Pomet (1658-1699) believed that the so-called Hog

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Figure 13. Portrait of Georg Eberhard Rumpf (1627-1702), from Rumphius (1705).

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Stone was different from the Porcupine Stone, although Nicolas Lemery (1645-1715) suggested that they are synonymous, an opinion strongly supported by Sir John Hill (circa 1716-1775) in his *History of the Materia Medica*.[14] Charles Lockyer (died 1752), chief accountant to the South Sea Company and who gave evidence to the House of Commons enquiry into the South Sea Bubble, indicated that the Hog Deer produces a bitter bezoar (*Pedra de porco Siacca*), 'valued at ten times its weight in gold', and which is brown in colour with a smooth outer surface covering a fibrous interior. 'They swim on the water, and by infusion only, make it extream bitter'; the virtues of the stones included 'cleansing the Stomach, creating an Appetite, and sweetning the Blood'.[15] He described the Porcupine Bezoar, by contrast, as being 'redish and full of short transparent veins, something like the red sort of Marble', and that it sinks to the bottom of a water vessel, where it is left to steep for some time for its occult virtues to infuse the liquid.[16] Others have described the Porcupine Bezoar as being a yellowish brown stone whose external surface 'is covered in some parts, with a kind of blackish scales, like nails', but has 'neither laminae nor membranes, is neither ponderous nor smooth'.[17] George Motherby (1731-1793) recorded a similar description of the stone, saying that it consists of 'woolly fibres' and 'bitter, friable matter', was roundish in appearance, of pale, purple green or white colour, soft, smooth and slippery to the touch.[18]

The general consensus was that the Hog Stone and the Porcupine Stone were synonymous and that, amongst Porcupine Stones, those from Ceylon (now Sri Lanka) were by far the most inferior. The latter were designated *Pedra de porco spuria*, by Kaempfer (figs. 2 and 3 in Fig. 8).

As to the parts of the rodent's anatomy which yielded the stone, in addition to the skin cited above, it has been ascribed to the liver, stomach and intestines, but most authors link it to the gall bladder. Albertus Seba, for example, states that 'this stone originates in the bitter fluid gall of the animal, a small grain the size of a pin-head gradually increasing to the size of the yolk of a hen's or a duck's egg.'[19] It is described as being the size of a filbert (Hazel nut), nutmeg, walnut and a human fingernail.[20] Georg Eberhard Rumpf (1627-1702; Fig. 13) was born in Germany, set sail for Brazil and then spent 3 years in Portugal before joining the Dutch East India Company. He arrived at Batavia (Jakarta) in 1653 and quickly established a reputation as a botanist, becoming known as *Plinius Indicus* – the Pliny of the Indies. In spite of blindness caused by glaucoma, and much personal tragedy, he completed his *Amboinsche Rariteitkamer* (Amboina Curiosity Cabinet), eventually to be published in 1705. In this work, he pays considerable attention to Porcupine Bezoars, stating that they are small in size – up to that of musket balls[21] – this feature distinguishing them from the larger Pig Bezoars.

Value of the stone

Writing to wealthy banker Philip Eduard Fugger (1546-1615), Christoph Hyeble (1551-1600; also known as Christoph Hieblin) wrote:

> This stone should be held in high esteem and may be used with confidence not only by those facing imminent death, but also in other dangers, be it at home or abroad, particularly in our present time in which many godless and wicked people have stealthily murdered several noble persons with deadly poison. For this reason, it is advisable for all to obtain a bezoar stone, regardless of how much effort and money it may take, and to have it readily available at all times as a precious treasure and antidote.[22]

With such a ringing endorsement of bezoar stones, it is no wonder that they, and porcupine bezoars in particular, should command such high contemporary prices.[23] One specimen was given by Ferdinando I de Medici (1549-1609), Grand Duke of Tuscany, to Eleonora de Medici (1567-1611), Duchess of Mantua, whilst others were auctioned as part of the estates of the Dutch upper classes.[24] Rumphius records that Porcupine Bezoars were sold locally for up to 200 ducats and 100 Rixdollars apiece, and Edmund Chishull (1671-1733) notes in his diary whilst acting as Chaplain to the Levant Company, that a single stone fetched 100 ducats. Alfred Hart Everett (1848-1898), a British civil servant and administrator in Borneo, and an accomplished naturalist, wrote about the 'Guliga landak' or Porcupine Stone from Borneo in 1879, noting that, at the time, it cost up to $4 per 'amas'.[25] Peter Borschberg has recently calculated that, assuming an average porcupine

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bezoar to weigh 7g, market values would have been up to forty times its own weight in gold.

Walter William Skeat (1866-1953) was an English anthropologist who, following a classical education at Christ's College, Cambridge, joined the civil service of the state of Selangor in the Malay Peninsula in 1891. Writing about Porcupine Stones in his classic study of Malay magic, he records having been asked for $200 for a small stone which the owner kept protected in cotton wool in a small tin box. The stone was surrounded by grains of rice, which the vendor swore the stone fed upon![26]

The German physician and student of Hermann Boerhaave, Hieronymus David Gaubius (1705–1780) uses the Porcupine Bezoar as an example of a medicine of high price but 'otherwise of no great efficacy'.[27] Those who could not afford to buy their own stone could always rent from an apothecary. Specimens mounted in gold cages were available for hire at the sum of one ducat for a full day from various German druggists.[28]

Tests of veracity

Commanding such high prices, it is little wonder that counterfeits began to flood the market, some of which were positively dangerous (sometimes containing mercury or antimony), bringing the question of how to tell an authentic stone to the fore.[29] Pedro Teixeira (circa 1570--1641), the famous Portuguese explorer, traveled to Goa sometime after 1586. Travelling on to Persia, he learned the language, and collected books and manuscripts on the history of the country. Teixeira translated and summarised the Tārīkh-i rawzat al-safā ('History of the kings of Persia') by Mīr Khvānd, Muhammad ibn Khāvandshāh (1433-1498), a Persian chronicle of the kings of Hurmuz, and published an account of his own voyage from India to Italy in 1600-01. Captain John Stevens (died 1726), a prolific translator of Spanish and Portuguese books, produced a highly embellished English version in 1715, which is the volume consulted for this study.[30] Two tests of authenticity are given in this work:

> The first is to take in one's hand a little lime worked up with water, and sprinkle the stone therewith, and if the lime turns yellow, and the stone is not wasted, it is genuine. The second test is better and surer, that is, to weigh the stone, put it into a vessel of water, leave it there six or seven hours, take it out, and weigh it again. If it keeps its form and weight, it is good, but if it breaks up, or melts, or gains weight, it is counterfeit.

Walter Skeat records[31] that, on enquiring how he could be certain that a very expensive specimen offered to him for sale was, indeed, genuine, he was told that 'if it were placed on an inverted tumbler and touched with the point of a *k'ris* (dagger) or a lime fruit it would commence to move about'. Once performed, the test duly confirmed the authenticity of the stone, but Skeat was not deceived by the sleight of hand used by the salesman to bring about its movement. It seems that fakes were proclaimed real by the trickery of fraudsters!

Synonyms of the stone: the following names were encountered for this stone during the course of this study: Porcupine Bezoar; Hystricum; Bezoar Hystricis; Bezoar Hystricum; Lapis Hystricis; Hystricites; Pila Hystricis; Bezoar Porci; Pedro del Porco; Piedra de Puerco; Pedro de Vasso; Hog Stone; Hog Bezoar; Boar Bezoar; Lapis porcinus; Malacca Stone; Lapis Malaccensis; Malacensis Lapis; Mastricha de Soha; Mastica de Soho; Indian Porcupine-Stone; Pedra de porco Siacca; Pedra de porco d'Espinha; Culiga landha; Humala.[32]

Figure 14. Portrait of Robert Boyle (1627-1691). Line engraving 1744 by Frederic Kerseboom after Bernard Baron. Reproduced by kind permission of the Wellcome Library, London.

Therapeutic uses of the stone

Jakob de Bondt (1591-1631) gained his MD from Leiden in 1614, and joined the Dutch East India Company in 1626 as Doctor, Dispenser and Inspector of Surgeons. Sailing to the East Indies in 1627, he wrote the manuscript of his famous *De Medicina Indinorum* over the next four years. Its publication was posthumous, however, appearing in 1642, eleven years after his death at Batavia (now Jakarta). A second, expanded edition was produced by Willem Piso in 1658, and an English translation appeared in 1769.[33] De Bondt described the Malacca Stone as being formed in the 'stomachs of porcupines with long feathers' (i.e. spines), and as being 'soft and fat to the touch, like Spanish soap'. He recommended that the stone be 'infused in wine for the cholera'. This disease went under the name of *Mordexi*, *Mordixim*, or *Mordechi* by the locals,[34] and de Bondt noted that it was capable of killing within a few hours of infection. He also gave the warning that the stone proved to be an abortifacient if infusions were prescribed during pregnancy; indeed, he reported that, in the event of suffering menstrual problems, women had only to hold the stone in their hands in order to receive some benefit.

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'Infinite medicinal virtues' were ascribed to the porcupine bezoar by local people, whilst Sir Tancred Robinson (1647/8–1748) is credited with the observation that it is 'an excellent Alexipharmic'.[35]

Whilst medical men from classical times onward described the actions of various plant, animal and mineral materials in term of their 'hidden vertues' or 'occult qualities', Robert Boyle (1627-1691; Fig. 14) attempted to put this onto a scientific footing with his Doctrine of Effluviums. He envisaged that 'the Effluvia of Bodies may consist of Particles extremely small', and that these 'invisible Agents' might act upon 'Bodies', causing them to change; he used the 'divers effects of bodies that are applied immediately to ours' as examples to support his thesis – 'Bloodstones, Cornelians, Nephritik-stones, Lapis malacensis and some Amulets' – 'the subtle Emanations that pass thorow the Pores of the Skin to the inward parts of the Body' producing the therapeutic effect. He marvelled at the fact that a person holding a Spanish Blister Beetle (Cantharides) in their hand 'have Grievous Pains produced in their Urinary parts, as it has happened to me as well as to many others'.[36]

Following his medical studies at Leiden, Paul Barbette (1620-1666?) went on to practice both medicine and surgery in Amsterdam. A prolific author, he comments that the Porcupine Stone is useful as a sudorific against the fevers produced by the Plague. He recommends that it 'it be steeped for a while in your ordinary drink'; an added benefit is that it supposedly refreshes the heart. One drawback identified by Barbette is that 'every time it is infused, it abates somewhat of its quantity'.[37]

Albertus Seba notes that they were prescribed for burning fevers, acute and malignant diseases, 'le pourpre' (possibly the acute febrile illness caused by *Rickettsia* and spread by means of infected ticks in North and South America), small pox, measles, jaundice, bilious and other ailments, and hysterical and splenetic conditions. He envisaged that 'a corrupted bile' was the source of these disorders.[38] Assuming that the stone was true and the preparation of the prescription good, Seba was confident in the efficacy of this stone to 'calm the agitation of the blood … revive the vital spirits and excite a gentle sweat'. He commended using it as an infusion in rain water, distilled water, Honey water, Thistle water, Linden flower water or Greater Celandine water.

The famous Leiden physician, Frederick Dekkers (1648-1720), commended 6 grains of finely ground Porcupine Stone mixed with 5 grains each of pearls and Stag's Horn (Cornu cervi) for all malignant and acute diseases.[39]

Michael Bernhard Valentini (1657-1729) illustrated and commented on a specimen of 'Lapis Malacensis' (Fig. 15) in the catalogue of his *wunderkammer*, which was published in three volumes over a time span of ten years.[40] He comments that it is a most effective remedy for poisons and a strong sudorific when fine grains are taken in cordial water or real wine.

The Porcupine Bezoar has been used as an almost universal medicine, especially in cases of poisoning and

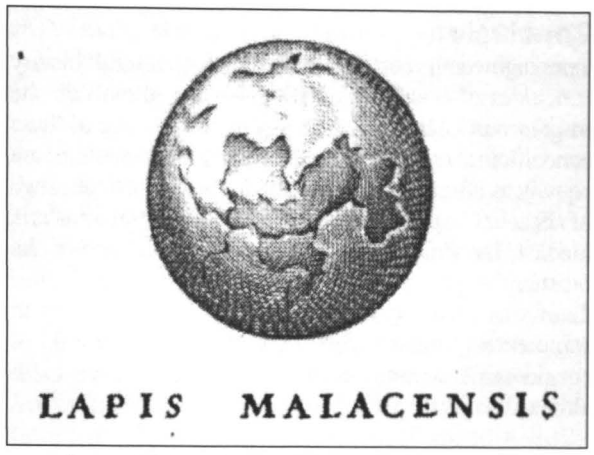

Figure 15. Specimen of *Lapis Malacensis* from Michael Bernhard Valentini's *Museum Museorum* (1704-1714).

malignant fevers.[41] Hermann Boerhaave (1668-1738), the celebrated Dutch scientist who studied, qualified and then taught at Leiden, states that, although credited with great powers, he never came across a Porcupine Stone used in Prescriptions.[42] However, it was still being recommended in 1755, infused in Carduus water (thistle water) or Rhenish Wine for biliousness.[43] Ephraim Chambers (circa 1680-1740), the English writer and encyclopaedist, states that it was often used against the plague and many other diseases, and commonly kept in gold boxes for infusion into a liquor (for only a few minutes 'till it communicates a bitterness to it').[44] Others indicate that several hours of soaking is needed, however, before giving rise to a greenish tincture which was used against 'severish distempers' and with some success for 'strengthening the stomach'.[45]

Echoing Barbette's observations, Seba concurs that the stone loses some of its potency with each use. He cites that 15 minutes is sufficient time for the liquid to be infused with the virtue and bitter taste of the stone on the occasion of its first soaking, but that the time period needed to deliver the healing qualities doubles with each use. He notes that drying the stones after use results in their developing a white and shiny surface and that, although seemingly exhausted of its powers, 3 grains taken in wine have proved still to be very effective for those that could afford it.

The most extensive list of therapeutic applications of the Porcupine Stone is given by Eberhard Rumpf, repeating information from his colleague Albertus Polonus, who commends it for kidney stones, pleurisy, cholera, fevers, palpitations of the heart, epilepsy, intestinal worms, the bloody flux, colic, flatulence, poisoning, internal abscesses (apostems) and stomach pains.[46] In addition, it has been recorded as being used against intestinal obstructions, jaundice and chicken pox.[47]

It may even have been used amuletically as a prophylactic. Peter Borschberg has suggested that bezoars mounted in gold filigree cages were worn around the neck in order to ward off disease, and perhaps to advertise the fact that the bearer was sufficiently rich and important to carry an antidote to any poison that a would-be assassin might care to use against them.[48]

https://doi.org/10.24355/dbbs.084-201802161454

Conclusion

One eighteenth century dictionary of natural history concludes that 'there is scarcely an animal of the frugivorous kind which does not produce some of these concretions; and probably those of one creature are equally as efficacious as those of another'.[49] Of the range of bezoars which appeared in the western materia medica, the Porcupine Stone was certainly one of the most highly prized and expensive. Whilst the market for them was driven partly by their exotic nature and, to some extent, medical fashion, it occupied a position of considerable esteem in the apothecarial arsenal for almost 200 years, at least for those who could afford it.

It is Albertus Seba's expression of wonder that most fittingly summarises the reverence in which this stone was held:

> From everything we have said is it not clear how great the bounty of God has been to have placed in these vile animals such an excellent medicine for our use? A stone born of morbific (disease-causing) origins in this animal, given to humans as an incomparable remedy for the most pressing and dangerous diseases whilst he is down here.[50]

Acknowledgements

I am very grateful to Peter Homan, John Betts and the Royal Pharmaceutical Society for access to the specimens described in this paper, and for permission to publish the material. The Wellcome Library kindly gave permission to reproduce several figures. The Boerhaave Museum (Leiden) also kindly gave permission to use their image of the porcupine stone in their collection.

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ISSN: 0079-1393 Indexed in Medline as Pharm. Hist. (Lond.)

Typeset and Produced by Ralph Allen Press Ltd, Bath BA1 3EN

https://doi.org/10.24355/dbbs.084-201802161454

PHARMACEUTICAL HISTORIAN

Vol. 43 No. 2
June 2013

British Society for the History of Pharmacy
Q House, Troon Way Business Centre, Humberstone Lane,
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Founded 1967

https://doi.org/10.24355/dbbs.084-201802161454

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The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

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https://doi.org/10.24355/dbbs.084-201802161454

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Contents

Diary

Please note that evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated.

Wednesday 19 June 2013 Visit to Gordon Museum, London. Details have been circulated; booking needed.

Monday 7 October 2013
'The History of "The Square"', by Briony Hudson, BSHP President 2013, at Lambeth.

Wednesday 6 November 2013
Joint meeting at Cardiff University. 'Back to Cleopatra's Kitchen: what I have learnt from experiments with ancient remedies' by Laurence Totelin.

Monday 10 February 2014
'A History of Inhalers'

Facebook You can find BSHP by searching for "British Society for the History of Pharmacy" once you have logged into Facebook.

International Society for the History of Pharmacy

41st Congress for the History of Pharmacy, Paris

The 41st Congress will be held from Tuesday 10 to Saturday 14 September 2013 at the Couvent des Cordeliers, Paris.

The two main themes will be the history of the history of pharmacy itself, celebrating the centenary year of la Société d'Histoire de la Pharmacie, and the bicentenary of the death of the military pharmacist Antoine Augustin Parmentier, well known for his researches on nutrition and hygiene.

Details and booking on the website: **http://www.41ichp.org**

Offer to members

Patrizia Catellani and Renzo Console have written and published a booklet entitled *Mithridates VI as a pharmacologist: history or myth?* The booklet, which was presented at the recent BSHP conference in Liverpool, can be mailed totally free of charge to any BSHP member who might be interested in it. Please send an email giving your name and full postal address. to Renzo at r.console@btinternet.com

Exhibition: Sir Stuart Threipland's medicine chest

There is an article by Dr Peter Worling to accompany an exhibition at the Royal College of Physicians of Edinburgh. For the article, see
http://www.rcpe.ac.uk/journal/issue/journal_43_1/Exhibition.pdf
The two lists of items in the chest can then be found at http://www.rcpe.ac.uk/journal/issue/journal_43_1/Threipland%20medicine%20chest_list**1**.pdf and at http://www.rcpe.ac.uk/journal/issue/journal_43_1/Threipland%20medicine%20chest_list**2**.pdf

https://doi.org/10.24355/dbbs.084-201802161454

Theriac: A European panacea in Japan

Sabine Anagnostou
Marburg, Germany

Theriac, one of the oldest European remedies, looks back on a more than thousand-year-old continuous medical-pharmaceutical tradition.[1] For centuries theriac was regarded as a panacea that could cure any kind of sickness, especially severe and fatal illnesses like the plague[2], smallpox, rabies and poisoning, and could even prolong human life. As a result of intercultural exchange and – from the early modern period – of European expansion, theriac was distributed all over the world and integrated into many materia medica systems, often in a specified local composition.[3]

Theriac was developed from the famous Mithridat(i)um created by the King of Pontos, Mithridates VI Eupator (c. 132–63 BC), that was meant to protect him from poisoning – whether from the attacks of his enemies or poisonous animals. The exact composition of the original substance is not known, but the Romans developed many variations, which were handed down by Galenos of Pergamon (129–c. 201AD) in his work *De Antidotis*.[4] Andromachos the elder, who was the personal physician of the emperor Nero (54–68), finally created the classical composition for the dark-brown electuary containing 64 ingredients including the obligatory and characteristic compounds flesh of vipers and opium. During the following centuries this so-called *Theriaca Andromachi* or *Electuarium Theriaca* became one of the most appreciated remedies in Europe and was even called 'domina medicinarum'.[5] It was believed to be a miracle cure, especially during the time of the Black Death (plague) in the Middle Ages. The classical formula by Andromachos was often modified over the centuries and the number of compounds grew to nearly 400 in the 17th century. From the 18th century on theriac gradually lost its great popularity, but it remained an element of the official material medica and was still listed in the *Ergänzungsbuch zum Deutschen Arzneibuch* 6 (EB 6) in 1941.[6] Of course, by then the classical composition had changed significantly – the number of compounds was reduced drastically and the composition no longer included either vipers or opium. Even today theriac is a compound of the famous *Schwedenbitter nach Maria Treben*, but the formula of this theriac bears little resemblance to Andromachos' ancient composition.

The universal remedy was also introduced into Arabian-Islamic culture and mentioned in most of the celebrated medical-pharmaceutical works like the *Canon medicinae* by Avicenna (980–1037), while other Arabian scholars such as Ibn Ğuğul (943/44– c. 994) created a special literature about theriac.[7]

Theriac was probably brought to China in the 7th century either from Persia by commercial contacts or from Byzantium by political relations, and Arabic-Islamic treatises. The famous Chinese work on medicinal drugs *Xinxiu bencao* mentions a remedy named *diyejia*, which

Figure. 1: Glass vessel containing theriac, 18th C.
© Pharmaziemuseum Brixen [Bressanone]: Photo: O. Peer

was brought to China by strangers from time to time.[8] *Diyejia* has been identified as theriac even though the description of this composition leaves doubts about this identification. Theriac was evidently not incorporated into the Chinese material medica in its classical composition, while the word *diyejia* itself developed into a category for antidotes without referring to a special remedy.[9]

With the European expansion in early modern times the use of the classical panacea was introduced by missionaries, merchants and physicians use in many different regions around the globe. In Brazil, Jesuit missionaries even developed a special variation called *Brazilian theriac* which contained genuine American medicinal plants that were thought to have them same efficacy as the traditional compounds of the European theriac.[10]

It is not exactly known when the universal remedy arrived in Japan. It may have already formed a part of the 16th century trade in commodities between the Portuguese and the Japanese, or missionaries may have brought it to Japan.[11] Around 1557 the Portuguese physician and Jesuit Luis Almeida (1525–1583) founded the first hospital and leprosarium in Japan,[12] and as theriac was used as a panacea to treat any kind of sickness, even the life-threatening ones, we may suppose that it was among the remedies Almeida used to treat his patients. Indeed theriac was a part of the basic medical equipment of the Jesuit missionaries, as a manuscript from 1664 recommended them to carry at least four ounces of theriac on their journey to the overseas missions, following the example of Father Heinrich Roth (1620–1668), who worked for many years in the Asian mission, to provide themselves with this universal remedy and to be able to care for the sick.[13] By the end of the 16th century the Franciscans had also established hospitals and leprosaria in Japan, for example in Kyôto, Nagasaki and Osaka.[14] It is likely that the Franciscans too used the classical European panacea.

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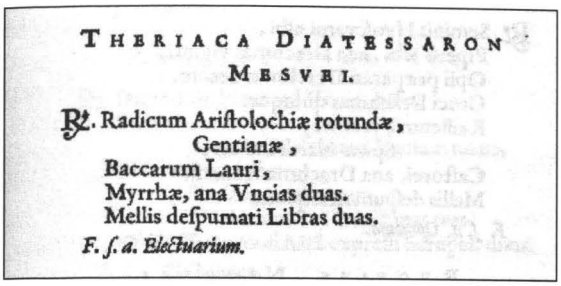

THERIACA DIATESSARON
MESVEI.

℞. Radicum Ariſtolochiæ rotundæ,
Gentianæ,
Baccarum Lauri,
Myrrhæ, ana Vncias duas.
Mellis deſpumati Libras duas.
F. ſ. a. Electuarium.

Figure 2. Recipe for Theriaca Diatessaron. Pharmacopoea Amstelredamensis, 1636. Universitätsbibliothek Marburg.

In the 17th century, however, theriac was one of the elements of the intercultural transfer between the Japanese and the Dutch. Official lists of medicaments for the surgeons of the Dutch East Indian Company (1676, 1691, 1771, 1772) show that they used *Theriaca Andromachi* therapeutically.[15] Japanese physicians were obviously interested in European medicine and were even taught by Dutch surgeons who presented them with theriac as well as other European remedies. A Japanese manuscript in the library of the Medical Faculty of the Kyushu University describes Dutch surgery (Oranda geka seiden) and recipes of Dutch surgery (Oranda-den geka ruihô). Though originally dating from the 17th century and handed down in a copy from the 18th, the author mentions theriac among other remedies such as plasters, ointments, oils, flowers, and roots. He states that the Dutch surgeon, however, had not communicated the recipe and had explained that theriac could not be prepared in Japan since in Holland only apothecaries produced this composition but not surgeons. The Japanese physicians must therefore have learned about the composition and production of the theriac from a different treatise.[16]

It seems that the European panacea was incorporated into the Japanese materia medica for a while because the erudite physician Gempaku Sugita (1733–1817) composed a work on theriac with the title *Teriaka-ho-san*. Various recipes for theriac still circulated in Japan in the 19th century.[17] The Japanese were obviously not dependent on the import of theriac by this time. This may be the reason why the Swedish physician and botanist Karl Peter Thunberg (1743–1828) reported in the accounts of his journeys to Africa and Asia in 1792 that theriac was among the minor goods that private persons brought to Japan.[18]

However that may be, the classical *Theriaca Andromachi* remained an important and appreciated remedy especially in the intercultural exchange between the Dutch and the Japanese, as it was given as a present to officials, for example to the Governor of Nagasaki and the Interpreters College in 1804. In 1806 and 1807 they again received *Venetian theriac*, which was considered to be of highest quality.[19]

The Japanese were evidently familiar with different kinds of theriac, as various recipes for *theriaca diatessaron* (shō teriaka) from the Edo-era (1603–1868) show. This theriac contained only four compounds. The recipes might have been transmitted by Dutch pharmacopoeias that were available to Japanese physicians.[20] On the other hand, the question arises of how far information about the different types of theriac like the *theriaca diatessaron* and their compositions was also provided or influenced by the reception of Chinese medical-pharmaceutical knowledge.

Conclusion

The history of theriac in Japan is an intriguing and fascinating field of research especially for the history of pharmacy and medicine. Many aspects concerning the form of reception, the distribution, different uses, development of local formulas, influences of cross-cultural exchange and reception, incorporation of terms into languages and much more could be the topic of future studies. We hope that our contribution will inspire further interdisciplinary and international research on the introduction, dissemination and establishing of theriac in Japanese medicine and pharmacy.

Acknowledgements

The author is grateful to Ainley Wade for proofreading and improving the English text. She is also grateful to Elisabeth and Oswald Peer, Pharmaziemuseum Brixen (www.pharmaziemuseum.it) who generously provided the picture of the theriac vessel from their impressive collection.

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20. We thank Prof. Dr Harm Beukers, Scaliger Institute Leiden, for this information.

Civil War Pharmacy: Historical parallels and implications for disaster preparedness

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The effects of devastating warfare are not unprecedented in the American South. Drug shortages, supply and transportation disruptions, and lack of medical personnel became increasingly common in the Southern Confederacy near the midpoint of the Civil War (1861-1865), particularly as the Federal 'Anaconda' blockade of southern sea ports gradually tightened.[1] The burning of Richmond and Atlanta also illustrate the degree of desolation that intensified the strain on resources and medical infrastructure.

The modern era is marred with disasters similar to those faced by Confederate citizens during the Civil War. While terrorism is an unconventional method of warfare, the effects of terrorist attacks may nonetheless consume government and medical resources. Widespread bio-terrorism and nuclear detonation are examples of possible scenarios that could cripple the economies of major cities as well as threaten the viability of a relatively healthy American medical system.

In light of efforts to combat terrorism, the history of the pharmacy profession during the American Civil War is an especially relevant topic to consider. Though pharmacists' interest in disaster preparedness activities have been relatively quiescent prior to the events of September 11, 2001, terrorist attacks and foiled plots occurring within the past decade have reawakened an interest in pharmacy's role(s) in disasters. Numerous disaster preparedness and response roles for pharmacists could be elucidated from the profession's activities during the Civil War. This article discusses the main functions of pharmacists as performed by medical storekeepers, medical purveyors, hospital stewards, and Southern civilian druggists – four roles that have substantial applicability to the 21st century pharmacy disaster response.

The war-era offices of medical storekeeper, medical purveyor, and hospital steward form a framework for present day pharmacy practice. The medical storekeeper was charged with storing, guarding, and issuing drug supplies when requested by medical purveyors, who were responsible for medication procurement, quality control, packaging, and distribution. Hospital stewards were administrators of field and post hospitals but were chiefly occupied with performing pharmacist duties such as compounding prescriptions and managing medical supplies.[1]

Medical support for the contending armies became increasingly important as the war progressed and the size of the armies grew. The Federal army, for example, increased from 16,000 to approximately 1 million by the end of the war.[1] The magnitude of the responsibility of

https://doi.org/10.24355/dbbs.084-201802161454

medical storekeepers and purveyors to provide for a rapidly growing force emphasise the importance of maintaining access to medications in the event of disasters, particularly through pharmacy logistics.[1]

Pincock et al. describe a disaster-readiness preparedness model to better prepare pharmacists and disaster planners for future disasters.[2] One pharmacist role provides logistical support through medication procurement, storage, inventory, distribution, and dispensing. The types of pharmacists proposed to carry out these activities include a pharmacy readiness logistician, a weapons of mass destruction/pandemic readiness pharmacist, and a pharmacist readiness manager.[2] Several articles in the pharmacy literature support the importance of pharmacy logistics in disaster medical response. For example, the importance of drug acquisition and distribution for hospital employees and their families, medication procurement, repackaging, distribution, control, and dispensing site layout, and the development of drug distribution systems in disaster settings all certify the importance of pharmacy logistics.[3-5] The procurement and distribution roles of medical storekeepers and purveyors remain an integral component of an effective medical response and may offer more than historical interest by serving as an important precedent for pharmacist logisticians.

Hospital stewards during the Civil War offer singular examples of the administrative responsibilities that may be assumed by pharmacists. Flannery notes that:

> Virtually everyone, except physicians, reported to the steward, who served as the hospital's chief administrator. On the instructions of the senior medical officer, all issues of order and security, light and ventilation, quality and quantity of food, cleanliness and orderliness of the wards and grounds devolved to the steward. [...] he was to receive 'obedience from all non-commissioned officers, enlisted men, and citizen nurses in the hospital.'[1]

Aside from managerial duties, the core function of the hospital steward remained that of a pharmacist. It is worth noting that chief surgeons often appointed men to perform the duties of hospital steward who were not necessarily trained in the skills of an apothecary.[1] Some hospital stewards may initially have been unskilled in pharmacy practice, but their efforts in developing compounding and medication management skills centralised their role in the management of field and post hospitals. Although the hospital steward may have had considerably more authority compared to most modern-day pharmacists, the duties of the hospital steward may be considered more clinically-oriented than the distribution responsibilities of medical storekeepers and purveyors.

Several examples of clinical pharmacy duties in disaster management, like those of hospital stewards, have recently resurfaced. Though 'modern' when compared to the Civil War era, the 1966 statement by the American Pharmaceutical Association (APhA) on disaster preparedness encourages pharmacists, among other duties, to assume leadership responsibilities in the development and maintenance of an organised nuclear fallout shelter, to offer medical aid in the absence of a physician or other medical personnel, and to be pre-trained to perform an array of duties that traditionally are subsumed by other disciplines.[6] Schwerman echoes the duties presented by APhA by noting pharmacists' capacity to act as an administrator or as a supervisor of pharmacy, laboratory, or central supply in the absence of adequate manpower.[7] Cohen similarly emphasises clinical and leadership roles of pharmacists in disasters by describing the development of a Pharmacy Emergency Response Team (PERT) whose mission is to

> maintain, prepare, mobilize, distribute, and track [the hospital's] stockpile and provide targeted pharmaceutical care intelligence needed to assist in the detection and mitigation of victims exposed to [chemical, biologic, radiologic, and nuclear] agents.[8]

That the duties of early pharmacists – namely, the hospital stewards and medical purveyors – contributed greatly to the effectiveness of the medical response is best summarised in the following quote:

> The ability of the surgeon in the field and hospital was directly dependent on the administrative effectiveness of the supply and provisioning system.[1]

These pharmacist-oriented duties, some of which have been translated into the modern context, remain vital to an effective disaster response.

Civilian pharmacists, particularly in many locales within the Confederacy, were the only healthcare provider available and often acted as both pharmacist and physician.[1] Flannery notes that 'the larger and richer economies of the North permitted civilian health care to proceed independently of the war effort,' but this was not the case in the South.[1] To increase the size of the army and remedy the shortage of medical personnel, the Confederate Congress passed the 1862 Conscription Act, which exempted from military service 'in each apothecary store now established and doing business one apothecary in good standing, who is a practical druggist'.[1] While a medical manpower shortage due to disaster is not unrealistic in modern America, one noteworthy example of medical system shortages and collapse is Ontario's response to the Severe Acute Respiratory Syndrome (SARS) crisis of 2004.

During the SARS crisis in Ontario, Canada, many hospitals and clinics closed to prevent the spread of the virus to the community. As a result, pharmacies that remained open for business became the city's healthcare centres and pharmacists the primary healthcare provider. The authors concluded that in times of crisis, pharmacists begin to assume duties beyond their traditional scope of practice and that pharmacists would do well to cross-train with allied health professionals before an event occurred to maximise role flexibility.[9] This recent report not only reaches back to the resiliency of Southern civilian pharmacists but also corroborates well with Schwerman's 1967 description of pharmacists acting as 'house doctors' in the absence of the physician and APhA's 1966 statement encouraging pharmacists to be pre-trained to handle various contingencies normally performed by other disciplines.[7,6]

Understanding and appreciating history is important not only to avoid repeating past failures but to employ past successes to present contingencies. The profession of pharmacy continues to find new ways to enhance the

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medical care of patients, and in many cases this involves incorporating innovative specialisations into pharmacy practice.[10] Current disaster roles embody the historical themes established by medical storekeepers, medical purveyors, hospital stewards, and Confederate civilian pharmacists. Greater pharmacist involvement, however, may eventually be warranted in disasters that drain healthcare resources. With our eyes on the examples set by our Civil War pharmacy forebears, modern-day pharmacists can meet future disasters remembering that lessons from the past may illumine the path forward.

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Medical supplies for the expeditions of the heroic age of Antarctic exploration: Injections, inhalations and suppositories

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This paper describes the injection equipment and the drugs given by injection, inhalation and suppository, on Scott and Shackleton's expeditions to the Antarctic.

A large number of drugs were taken on the expeditions of the heroic age of Antarctic exploration, with the drugs for the British and Australian expeditions mostly being supplied by Burroughs Wellcome & Co (BW&Co). Drugs for injection were often supplied, together with a syringe, in small pocket cases. This paper describes the drugs taken for use by injection, inhalation and by suppository and also the injection cases supplied to the expeditions. It also describes how drugs were used but this information is very limited.

Injection cases

Discovery expedition 1901-4

The drugs supplied to the *Discovery* included a No. 7 hypodermic case (Fig. 1) and some additional supplies for hypodermic use[1] which are described below.

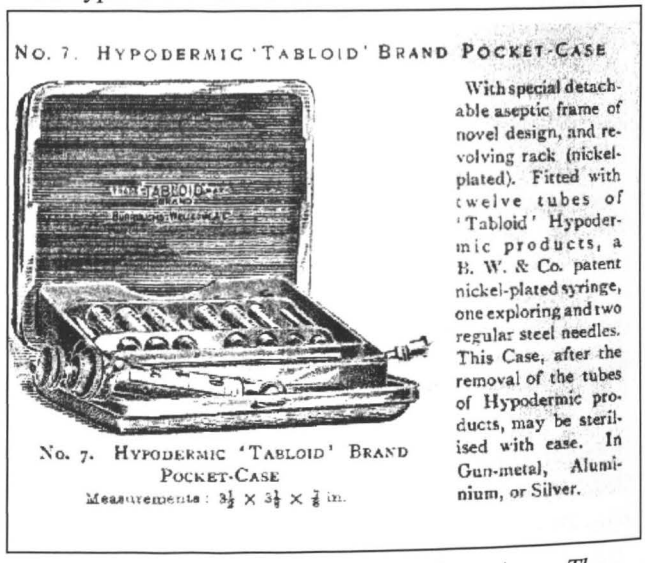

Figure 1. No. 7 hypodermic case from: Anon. *The Evolution of Antiseptic Surgery*. London: BW&Co, 1910: 120.

Terra Nova expedition 1910-3

In his description of the medical equipment taken by the *Terra Nova*, Dr Edward Atkinson says that they were supplied with three No. 7 hypodermic cases each containing a syringe with 12 tubes of hypodermic products and he also describes a no. 10 hypodermic case (Fig. 2) containing five tubes of hypodermic products.[2] However Burroughs Wellcome say that they supplied three No. 7 cases and a number 32 case (Fig. 3), containing five tubes of tabloids, in each of 12 canvas

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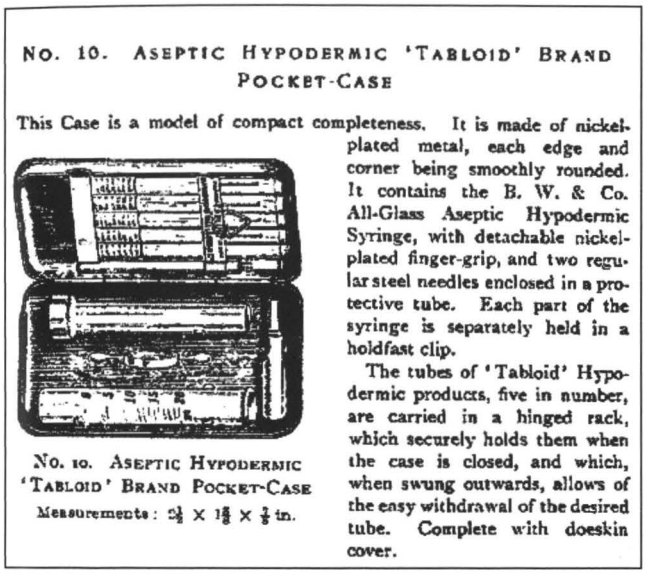


NO. 10. ASEPTIC HYPODERMIC 'TABLOID' BRAND POCKET-CASE

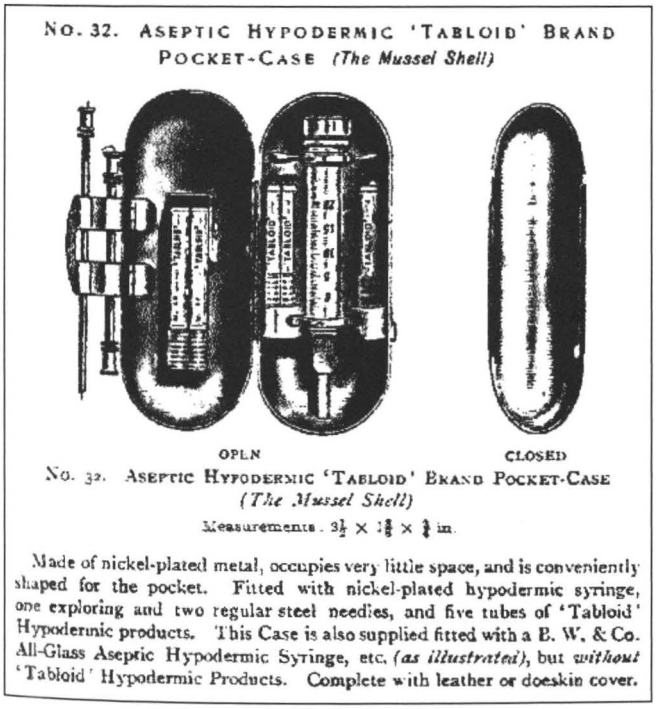
This Case is a model of compact completeness. It is made of nickel-plated metal, each edge and corner being smoothly rounded. It contains the B. W. & Co. All-Glass Aseptic Hypodermic Syringe, with detachable nickel-plated finger-grip, and two regular steel needles enclosed in a protective tube. Each part of the syringe is separately held in a holdfast clip.

The tubes of 'Tabloid' Hypodermic products, five in number, are carried in a hinged rack, which securely holds them when the case is closed, and which, when swung outwards, allows of the easy withdrawal of the desired tube. Complete with doeskin cover.

No. 10. ASEPTIC HYPODERMIC 'TABLOID' BRAND POCKET-CASE

Measurements: 2¾ × 1⅝ × ⅝ in.

Figure 2. No. 10 hypodermic case from: Anon. *The Evolution of Antiseptic Surgery*. London: BW&Co, 1910: 120.



NO. 32. ASEPTIC HYPODERMIC 'TABLOID' BRAND POCKET-CASE *(The Mussel Shell)*

OPEN CLOSED

No. 32. ASEPTIC HYPODERMIC 'TABLOID' BRAND POCKET-CASE *(The Mussel Shell)*

Measurements: 3½ × 1⅝ × ⅝ in.

Made of nickel-plated metal, occupies very little space, and is conveniently shaped for the pocket. Fitted with nickel-plated hypodermic syringe, one exploring and two regular steel needles, and five tubes of 'Tabloid' Hypodermic products. This Case is also supplied fitted with a B. W. & Co. All-Glass Aseptic Hypodermic Syringe, etc. *(as illustrated)*, but *without* 'Tabloid' Hypodermic Products. Complete with leather or doeskin cover.

Figure 3. No. 32 hypodermic case from: Anon. *The Evolution of Antiseptic Surgery*. London: BW&Co, 1910: 122.

sledging cases.[3] However the contents of the injection cases described in the two sources are identical.

Imperial Trans-Antarctic Expedition 1914-7 (ITAE)

The list of equipment supplied by Burroughs Wellcome[4] to this expedition is divided into equipment for the Weddell Sea Party, the Ross Sea Party, the plateau sledge and the two ships. The drugs and equipment for the Weddell Sea party included a No 7 'Tabloid hypodermic case'. A No. 254 'Tabloid' medical case containing 'Hypodermic products' was supplied for the plateau sledge. There is no specific number attached to these, but the contents are the same as the No. 32 (or No. 10) hypodermic case mentioned above. In addition there were two 2 canvas sledging cases, each of which contained a 'No. 3 hypodermic case' (Fig. 4) This has 12 tubes of tabloid hypodermic products.

Injections were almost invariably given subcutaneously (hypodermic). Drugs for injection came as solid 'tabloids' which needed to be dissolved. The instructions read:

> Draw about 10 minims of sterile water into the syringe, remove the nozzle and drop a 'Tabloid' hypodermic product into the barrel. Replace the nozzle … expel all air … shake gently … solution takes place almost immediately … the needle is then fitted…[5]

The Royal Geographical Society's *Hints for Travellers*, (copies of which were taken on the British and Australian expeditions), advised:

> The hypodermic syringe and needle must by perfectly cleaned; they may be boiled, or an antiseptic lotion, or alcohol (brandy or whisky) syringed through them. The solution to be injected should be made in a clean, ie boiled, spoon, by adding the drug to boiled water...[6]

The drug contents of these cases are shown in Table 1. Each tube contained either 12 or 20 'tabloids'. In addition each case contained a syringe and needles and a pestle and mortar, indicating that these drugs might need to be ground up to assist solution.

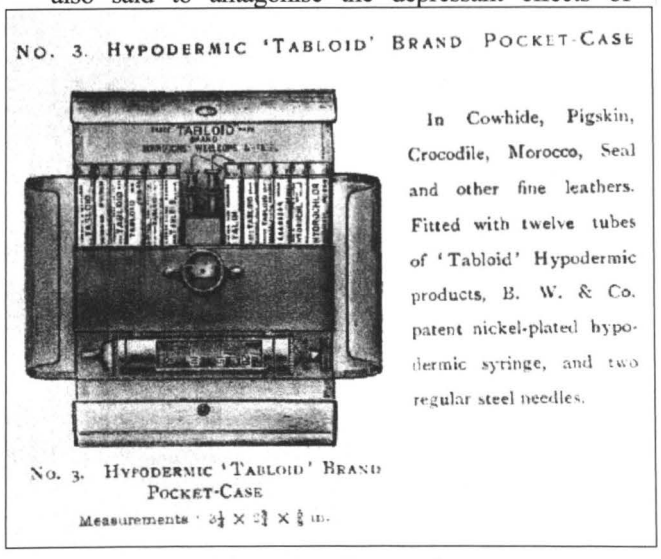
Dr Murray Levick (on the *Terra Nova* expedition) also ordered: an 'Imperial dental syringe (complete)' and '2 x 50 Novocain Dental Tablets'[7] which presumably were for injection. I have described the dental equipment taken in more detail elsewhere.[8]

Indications for the drugs

Some of these drugs (or their uses) may be unfamiliar so I give the uses as suggested by Burroughs Wellcome who provided them.[5] These are the indications for injection; the same drug given orally may have different uses.

Apomorphine was used as an emetic.

Atropine was often administered before chloroform anaesthesia, to prevent inhibition of the heart and was also said to antagonise the depressant effects of



NO. 3. HYPODERMIC 'TABLOID' BRAND POCKET-CASE

In Cowhide, Pigskin, Crocodile, Morocco, Seal and other fine leathers. Fitted with twelve tubes of 'Tabloid' Hypodermic products, B. W. & Co. patent nickel-plated hypodermic syringe, and two regular steel needles.

No. 3. HYPODERMIC 'TABLOID' BRAND POCKET-CASE

Measurements: 3¼ × 2¼ × ⅝ in.

Figure 4. No. 3 hypodermic case from: Anon. *The Evolution of Antiseptic Surgery*. London: BW&Co, 1910: 119.

https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Drug contents of hypodermic cases

	No. 7 cases		No. 10 cases	Additional supplies not in special cases	
Tube each 'Tabloid' Hypodermic Products	***Discovery, Terra Nova***	**ITAE**	***Terra Nova***	***Discovery, Terra Nova***	**ITAE**
Apomorphine Hydrochloride gr. $^1/_{10}$	*	*			
Atropine Sulphate gr. $^1/_{100}$	*	*			*
Cocaine Hydrochloride gr. ½	*	*	*	*	
Cocaine Hydrochloride gr. 1/4				*	
Digitalin gr. $^1/_{100}$	*	*			*
Ergotinine Citrate gr. $^1/_{200}$	*	*			
Hyoscine Hydrobromide gr. $^1/_{200}$	*	*			
Morphine Sulphate gr.$^1/_4$	*	*	2	*Discovery* 2 *Terra Nova* 5	*
Morphine Hydrochloride gr. $^1/_4$				*	
Morphine Sulphate gr. $^1/_6$ and Atropine Sulphate, gr. $^1/_{180}$	*	*		*	*
Pilocarpine Nitrate gr. $^1/_6$	*	*			
Strychnine Sulphate gr. $^1/_{100}$	*	*	*	*	*
Aconitine Nitrate gr. $^1/_{260}$	*				
Anaesthetic Compound B (cocaine gr.$^1/_5$ + morphine gr. $^1/_{50}$)	*	*			
Caffeine Sodio-Salicylate gr. ½	*				
Digitalin, gr. $^1/_{100}$, and Strychnine Sulphate, gr. $^1/_{100}$	*	*	*		
Eucaine Hydrochloride gr.$^1/_3$	*	*			
Morphine Hydrochloride gr. ¼	*	*			
Hyoscine compound A (Hyoscine gr. $^1/_{100}$, Morphine gr. $^1/_4$ and Atropine gr. $^1/_{150}$)		2			*
Eserine salicylate gr. $^1/_{100}$				*	
Homatropine hydrochloride gr. $^1/_{25}$				*	

morphine on the respiratory centre. This, presumably, explains the combined preparation.

Ergotinine was 'used … subcutaneously, in uterine haemorrhage and haemorrhages generally. Action enhanced by addition of strychnine; frequently prescribed with morphine.'

Hyoscine was a 'powerful sedative used in cerebral excitement, mania and epilepsy… Combined with morphine, or morphine and atropine, has been used hypodermically as analgesic during labour and previous to induction of general anaesthesia.'

Pilocarpine. It is difficult to see why this was taken as an injection. It was said that it 'Increases salivary secretion, produces profuse sweating, increases secretion from nasal and bronchial mucous membranes and promotes activity of gastric and intestinal secretory glands… Diaphoretic in bronchial

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catarrh, and uraemic convulsions. Must be used with caution, as it causes inhibition of the heart.'

Strychnine was 'given hypodermically in cardiac syncope.'

Aconitine 'slows and weakens the heart's action by stimulating the vagus centre, reduces temperature, and is diaphoretic, anodyne and sedative.'

The dose of *morphine* in anaesthetic compound B is very low (gr.1/50 [1.5 mg] compared to the hypodermic dose of gr.1/4 [16.2 mg]) and so this was presumably being given in the belief that opiates had some kind of local anaesthetic action rather than for any systemic effect.

Caffeine sodio-salicylate was given more for the sodium salicylate content, as an analgesic.

Eserine (physostigmine) 'powerfully stimulates intestinal peristalsis. Has been suggested as a hypodermic purgative, but the fact that it produces vomiting and griping in purgative doses has prevented its general use. In paralytic distension of the bowel it was formerly the only remedy available, but the use of pituitary extract … has displaced it of recent years'.

However, to learn how it was intended that these drugs should be used, it may be more instructive to turn to the diaries of the non-medical expedition members. On the Ross Sea Party, there was no doctor: John Cope, the biologist, acted as doctor but Arnold Spencer-Smith and Irvine Gaze wrote themselves notes on the use of the drugs that they had with them. Perhaps they had received a tutorial from a doctor in Australia once it was known that there was no doctor in their party.

Arnold Spencer Smith's notes on the injectables[9] (including spelling mistakes) are:

Eucaine Hydroachloride: Cocaine as Anaesthetic. 2% solution. To be used for relieving pain in Eye. Toothache 2-4%. Local anaesthetic 4%. 1 Tab in 12 min. aq[ua]. = 2% solution.

Hyocine Hydrobromide Sedative (combined with morphine produces general anaesthesia). 1 Tab in 15 min aq. = 1% sol.

Strychnine sulphate Heart Failure. 1 tab in 20 min aq.

Morph. Atrop. Sulp. Analg[esic]. & sedative. Must not be used in bronchitis & congestion of brain. 1 Tab in 12 min. aq.

Digitalis Cardiac tonic. 1 in 5 min. aq

Anaesthetic comp. 1 in 110 min. aq (dangerous)

Irvine Gaze's notes[10] are very similar and had clearly been obtained from the same source.

The use of the drugs

I have found very little reference to the use of any injections and so it is difficult to know how much was used but it is clear that some was, as Atkinson says that more supplies of morphine and atropine, strychnine and anaesthetic compound B would have been desirable on the *Terra Nova* expedition.[2]

However, the only reference to morphine injection being used on that expedition, that I have found, was to Thomas Clissold who sustained a head injury after he fell off an iceberg,[11] though on the *Discovery* expedition, Dr Edward Wilson wrote of snow-blindness: 'sleep was the best and quickest cure of all, even if an injection of morphine had to be given to produce it.'[12] I have found no reference to the use of injectable strychnine or anaesthetic compound B on either expedition but on the *Scotia* expedition, when Allan Ramsay was dying of heart failure, Dr Harvey Pirie administered morphine and strychnine but to no avail[13] and on the Australian expedition, Dr Archibald McLean wrote 'Ninnis came in and told us about a dog with epileptic fits. [Dr] Jones gave it a hypodermic injection of morphine without result.'[14]

Comparison

Ships at sea have some similarities to an Antarctic expedition in that the environment may be hostile, and a single handed doctor (or ship's captain, when there is no doctor) is unable to refer any seriously ill or injured person to a hospital. At that time, with no radio communication, they were also unable to obtain advice. Indeed the first and final parts of all of these expeditions were long sea journeys, but the Antarctic explorers were away for considerably longer periods. Nevertheless it is interesting to compare the drugs taken with those required by the Board of Trade. In 1906, for ships of 100 passengers on a voyage of under 100 days, they only required four injections:[15]

Table 2. Drugs given by inhalation`

Brand name	Drug	Notes	Indication	*Discovery*	*Terra Nova*	ITAE
Vaporole	Amyl nitrate		See text	*	*	
Vereker	Ammonium chloride		Catarrh	*		
Vaporole	Ammonium chloride		Catarrh			*
Vaporole	Menthol snuff		Catarrh		*	*
	Menthol cones		Catarrh	*	*	
Vaporole	Aromatic ammonia	Sal volatile	Smelling salts		*	

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Drug	*Number*
Morphine tartrate gr.$^1/_4$	24
Atropine sulphate gr. $^1/_{100}$	12
Cocaine hydrochloride gr. $^1/_{20}$	24
Apomorphine gr. $^1/_{20}$	1 tube

The French equivalent (Ministre de la Marine et des Colonies) in 1908 seems only to have required injections of caffeine and cocaine. Morphine chlorhydrate is mentioned for the first time but it is not specified that this is an injection, though morphine injection is mentioned in 1926.[16]

Inhaled drugs

A number of drugs were given by inhalation (excluding anaesthetic agents). These are shown in Table 2 (p.31).

'Vaporole' and 'Vereker' were two brand names used by BW&Co. Vaporole products were for inhalation, external application or injection. Amyl nitrate and aromatic ammonia were both supplied in glass capsules contained within absorbent material. When the capsule was broken, the contents could be inhaled.

'Vereker' was a brand name for the Vereker ammonium chloride inhaler designed for delivering ammonium chloride though it could also be used for delivery of other inhaled products such as eucalyptus oil or pine oil.[17]

In 1910 BW&Co developed a new system for producing ammonium chloride in which they supplied 'Vaporole acid' (hydrochloric acid) and 'Vaporole alkali' (an ammonium salt) in an inhaler to produce ammonium chloride for inhalation.[18]

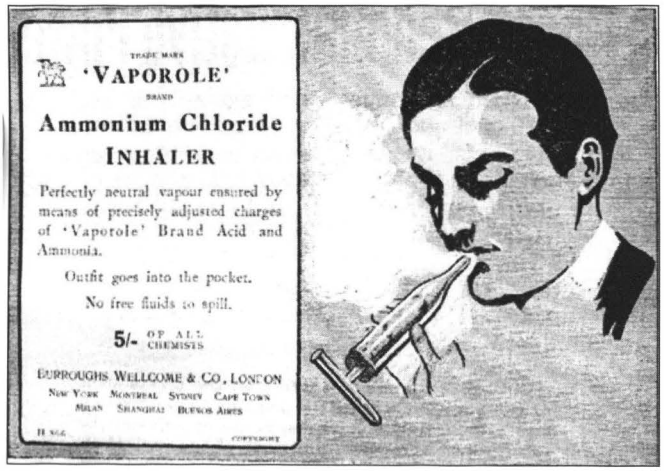

Figure 5. Advertisement for Vaporole inhaler. *The Medical Officer* 1911; 7 Jan: viii.

Amyl nitrate had uses other than for angina pectoris. It was a 'powerful dilator of peripheral vessels; employed in angina pectoris, conditions due to heightened arterial tension, haemoptysis, menorrhagia and other haemorrhages, tetanus, neuralgia, asthma, cocaine and strychnine poisoning, and to check excessive sweating.'[5]

Menthol snuff contained: ammonium chloride, bismuth oxychloride, 'Epinine' [adrenaline], eucaine, camphor and lycopodium powder.[5]

In addition to these, all three expeditions took spirits of turpentine (oleum terebinthinae) which could be used internally or inhaled for catarrh or other respiratory problems.

I have found no evidence of these preparations being used. Many writers commented that the expedition members generally did not suffer from colds. Dr Alexander Macklin (surgeon on two of Shackleton's expeditions) wrote "Bacterial affections are rare. 'Colds in the head' hardly ever occur …"[19] and Dr Erik Ekelöf (surgeon to the Swedish expedition) said "None of the wintering parties suffered from any of the common forms of 'colds' such as catarrhs of the nose, larynx, trachea and bronchi …"[20]

However they did occur. Herbert Ponting (the photographer on the *Terra Nova* expedition) wrote:

> I have read in books that there are no germs in the polar regions; that colds and such afflictions are unknown.… Whilst sleeping in my reindeer-skin sleeping bag that night, I caught an awful cold and for the whole of the next day … I suffered from paroxysms of sneezing. After that experience no one will ever convince me that microbes cannot stand the rigours of those regions.[21]

These 'colds' were usually associated with opening stored clothing or similar items. Thus Dr Eric Marshall in his medical report of the *Nimrod* expedition wrote:

> Members of the expedition did not suffer from colds … save in August 1908, when a bale of new clothing was opened in the hut, and the men were at once seized with acute nasal catarrh.[22]

Wilhelm Filchner (leader of the second German expedition) described the same thing after some bales of canvas were opened[23] and there are other examples. It is known that parainflenza viruses do not survive for this length of time in the Antarctic environment[24] and so there

Table 3. Drugs supplied as suppositories

Brand name	Drug	Size	Notes	Indication	*Discovery*	*Terra Nova*	ITAE
Enule	Gall & opium		Tannic acid & opium	Haemorrhoids, fissure	*	*	
Enule	Glycerin			Constipation	*	*	*
Enule	Morphia	gr ½		Analgesia	*	*	*
Enule	Tannic acid			Haemorrhoids, fissure	*	*	*

https://doi.org/10.24355/dbbs.084-201802161454

must be doubt as to whether other viruses can remain viable. It is possible that these were allergic reactions to some constituent of the dust[25] or organic toxic dust syndrome.[26] Whatever the diagnosis, the only treatment that I have seen recorded for these 'colds' was 'a dose of hot-Toddy before going to bed',[27] but it is likely that some of these inhalants were used.

Suppositories

Table 3 (p. 32) shows the drugs supplied as suppositories. The gall and opium suppositories probably reflect the belief that topical opiates had analgesic properties. This myth was exploded in 1910[28] which may explain why they were not taken on the ITAE which started in 1914.

Again, I do not know that any of these were actually used but a number of people are recorded as suffering from haemorrhoids and so it is likely that some were.

Acknowledgments

This research was funded by the Wellcome Trust who gave me a Short Term Research Award in the History of Medicine for Clinicians and Scientists for a study on "Medicine during the Heroic Age of Antarctic exploration". I would also like to thank Kelly Tyler-Lewis for pointing me in the direction of the diaries of Spencer Smith and Gaze.

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https://doi.org/10.24355/dbbs.084-201802161454

Laooq: Selective respiratory dosage form used in medieval Persia

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Since ancient times, medical preparations of natural medicaments have been used for their therapeutic effects. Many medical and pharmaceutical documents are found in the history of Persia and a number of pharmaceutical dosage forms have been reported in traditional Persian manuscripts. Linctuses (*Laooq*) are examples of such dosage forms which are relatively neglected in contemporary medicine. However they were widely used in Traditional Persian Medicine, especially for respiratory ailments. The current study aims to present different *Laooq* formulations along with their preparation and applications. The most popular pharmaceutical manuscripts of Persian medicine from the 9th to 18th centuries AD have been studied by searching for linctuses by using the term *Laooq*.

Traditional linctuses (*Laooq*) are viscous preparations with a viscosity between a syrup and electuary and should be taken orally by licking. Overall around 150 different *Laooq* formulations have been noted by Persian practitioners and honey was the base ingredient. Rose syrup (*Jullaab*), grape concentrated juice, almond oil and cow butter may be used in this dosage form. The *Laooq* formulation is not only a kind of traditional dosage form but it may also be a good candidate for formulation of new respiratory medicines. As the form can release the active component gradually it can be used as a retard formulation. This study presents the traditional pharmacological approaches for respiratory diseases. Thereby reported natural preparations can be selected for new research in complementary medicine.

Introduction

The history of drug therapy goes back to long ago when humans used natural medicines.[1] At the dawn of civilisation three natural sources (herbal, animal and mineral) were common in therapeutic preparations[2] which were mainly used within compound remedies. Herbal remedies were applied either individually or in combination with other natural medicaments. Because of recent pharmaceutical advances a wide variety of dosage forms are available today with specific routes of administration. Medical and pharmaceutical manuscripts by medieval Persian practitioners flourished by adding the existing experiences achieved by other civilisations to their own findings.[3, 4] Before the official separation of pharmacy from medicine around 1240 AD[5] Persian scholars like Avicenna and Rhazes had dedicated large parts of their impressive works to pharmaceutical practices.[6] So various pharmaceutical dosage forms are mentioned in traditional Persian medicine manuscripts.

One of these traditional compounds is *Laooq* which appears to be almost similar to Linctus. These remedies are widely prescribed in contemporary medicine for respiratory system ailments.[7] The traditional medicine manuscripts give numerous formulations of *Laooq* which can be considered as opportunities for investigation in pharmaceutical science. The current study aims to introduce different formulations of *Laooq* along with special related considerations and their indications.

Research method

This investigation is based on searching through some important traditional pharmaceutical manuscripts (*Qarabadins*) which were written between the 9th and 18th centuries AD. *Qarabadins* are formularies which generally present drug recipes and their indications.[8] Selected manuscripts are described. As the first part of this study, about 150 various *laooq* formulations were extracted from the books. Since those most cited possessed a better value for further research, a selection of them was analysed. In the second step, their ingredients' effects were extracted from a large traditional pharmacopoeia '*Makhzan-ol-advieh*'[9] to determine each ingredient's role in each formulation. In the third step the scientific names of materia medica in formulations were determined using other textbooks such as *Dictionary of Medicinal Plants*, *Popular Medicinal Plants of Iran*, *Pharmacographia Indica* and *Indian Medicinal Plants*.[10-13]

Results

Laooq (Linctus) as a dosage form is a combination of powdered medicines in honey, viscous syrup or other sweet additives.[14] Although this dosage form was generally specified for the respiratory system, some *Laooq* formulations were used in psychotic disorders, insomnia and constipation.[14] Today linctuses are defined as oral liquids which are mainly used as demulcent, expectorant, sedative or antimicrobial agents.[15] Examples are pholcodine, methadone and simple paediatric linctuses,[16, 17] which are principally applied in the treatment of cough and other respiratory disorders due to their soothing effects on inflamed mucous membranes18 These viscous preparations contain sugar or other sweeteners.[16]

According to traditional manuscripts *Laooq* is prepared with a special viscosity between syrup and electuary.[19] This lincture is taken orally by licking[7, 20] and its good taste helps increase the patient's compliance.[21] A demulcent effect is essential for those used for the respiratory system.[20]

https://doi.org/10.24355/dbbs.084-201802161454

Holding the preparation in the mouth is advisable so that the active components will release gradually.[19] Keeping the patient in a horizontal position patient during licking the drug increases the transit time of medicaments through the oesophagus.[22] Therefore it appears that *Laooq* was used as a selective retard dosage form for the respiratory system. It was considered that as the respiratory system is closely attached to gastrointestinal system, the onset of drug action would be the time of passing from the oesophagus.[14]

Traditional linctuses are categorised in four groups based on the therapeutic potency of their ingredients. It was noted that the potency and temperament of medicaments are associated and so the drug potencies will be divided into four levels. The first level is named *absolute food*. The second and third are called *medicinal foods* and *nutritional medicine*, respectively. The last one is *absolute medicine*.[9]

The first group of traditional linctuses contains the lowest potency medicines such as bean, roasted linseed or almond in combination with honey. The second category includes cucumber seeds, honeydew (*Cucumis melo*) and squash (*Cucurbita maxima*). In some cases rose oil or bitter almond oil with honey could be added to the formulation. The third group contains more potent drugs such as bitter almond, fenugreek, Indian frankincense or squill oxymel. Finally the most potent drugs such as pepper, cumin, or iris root are used in the last group.[20, 22]

Medicinal plants in *Laooq* formulations were either used individually or in addition to other medicaments. [19, 23, 24] The object of preparing compound remedies could be reduction of side effects, increase of the main ingredient's potency, taste improvement, enhancement of potency and correction of harmful properties.[14] Table 1 (p. 36) represents the reported medicinal plants which were used solely with basic ingredients such as honey, sugar or other non-medicinal accompaniments.[9] Selected *Laooq* formulations with their ingredients, indications and compounding methods are shown in Table 2 (p. 37).

The main indication of *Laooq* formulations is respiratory system diseases in which respiratory secretion disorders are common. Specific ingredients of this dosage form are able to improve the secretion process and expectoration. Almost all *laooq* dosage forms have honey as the basic ingredient for this purpose. Honey acts as a demulcent and facilitates mucus secretion.[22] Recent findings prove the expectorant property of honey.[25] Other bases such as rose syrup, grape concentrated juice, almond oil and cow butter are also used.[20, 21]

Discussion and conclusion

Laooq formulations which had been well-considered by traditional Persian practitioners, were applied widely for respiratory system complications. Recent researches prove relevant pharmacological effects of their ingredients. *Adiantum capillus-veneris* as an expectorant and demulcent brings up the phlegm and enhances respiratory system secretions.[26] *Allium sativum* is prescribed in chronic bronchitis, influenza and recurrent upper respiratory tract infections.[27] The effectiveness of *Althea officinalis* in cough and bronchitis was approved by the German Commission E. Demulcent effects of almond preparations and antitussive activity of saffron are noted in modern medicine.[26] Phenolic compounds in *Cydonia oblonga* have anti-influenza viral activity.[28] Muscle relaxant activity of *Elaeagnus angustifolia*[29] is beneficial for bronchospasm and asthma. The potent anti-inflammatory effect of fig leaves[30] confirm its use in asthma and cough. The antiallergic effects of liquorice is useful for asthma.[31] Modulatory effects of *Mentha piperita* on lung carcinogenicity in animal models are clues for its correct usage in related complications.[32] Active components of *Myrtus communis* with potent anti-inflammatory effects offer a new therapeutic approach for acute pulmonary inflammation.[33] *Plantago ovata* that had been given for pleurisy was evaluated as effective on respiratory tract inflammation.[34] *Sesamum indicum* acts as an angiogenesis inhibitor and stops progress of lung tumour adenocarcinoma.[35] An antitussive effect of *Portulaca oleracea was* affirmed by recent animal studies.[36]

Laooq in Persian traditional manuscripts is not only a traditional dosage form but it could also be considered as a good candidate for new respiratory medicines. Since they gradually release their active component, they could be prescribed as retard formulations. Besides the historical study on traditional Persian medicine and pharmacy, this study presents the pharmacological approaches of traditional practitioners and reported natural simple and compound preparations which can be selected for new researches in complementary medicine.

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https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Most often reported plants used solely in form of *Laooq* for respiratory ailments.

Linctus (Laooq)	Traditional name	Respiratory diseases	Part(s) used
Acacia arabica L.	*Samgh-e arabi*	Cough, Haemoptysis, Lung ulcers	Gum
Adiantum capillus-veneris L.	*Barsiavashan*	Asthma, Catarrh, Thoracalgia	Aerial part (cooked)
Alhagi maurorum Medik.	*Taranjebin*	Cough, Thoracalgia	Manna
Allium sativum L.	*Soom*	Asthma, Dysphonia	Bulb
Althea officinalis L.	*Khatmi*	Cough, Dysphonia, Laryngitis	Aerial parts (with honey)
Amygdalus communis L.	*Badam*	Asthma, Cough, Pleurisy	Oil (with sugar)
Astragalus spp.	*Katira*	Cough, Dysphonia, Haemoptysis	Gum
Boswellia serrata Triana & Planch.	*Kondor*	Cough, Dysphonia, Haemoptysis	Oleo gum resin
Brassica nigra L.	*Khardal-e-siah*	Asthma, Cough	Seed (with honey)
Brassica oleracea L.	*Kornob*	Cough (chronic)	Fruit (cooked)
Carthamus tinctorius L.	*Gholrang*	Dysphonia	Seed (extract) with honey
Carum carvi L.	*komoun*	Dyspnea, Orthopnoea	Seed (with vinegar)
Commiphora opobalsamum L.	*belsan*	Cough	Seed
Cordia myxa L.	*Sepestan*	Cough (warm& dry), Dysphonia	Fruit
Crocus sativus L.	*Zafaran*	Cough, Pleurisy	Stamens
Cucurbita maxima Duchesne	*Ghar'a*	Cough (warm), Thoracalgia	Seed (cooked with olive oil)
Cydonia oblonga Mill.	*behdaneh*	Cough (dry & warm)	Seed
Ficus carica L.	*Tin*	Asthma, Cough, Thoracalgia	Fruit, leaf
Glycyrrhiza glabra L.	*Shirin baian*	Asthma, Cough, Dysphonia	Root
Hyssopus officinalis L.	*Zoofa-ie iabes*	Asthma, Catarrh, Cough, Pulmonary oedema	Aerial parts
Iris spp.	*Irsa*	Asthma, Dyspnea, Pneumonia, Thoracalgia	Rhizome (cooked in wine)
Lepidium sativum L.	*Horf*	Asthma, Cough	Aerial parts (with honey)
Linum usitatissimum L.	*Katan*	Cough (wet), Haemoptysis	Seed (with honey/ roasted)
Liquidambar orientalis L.	*Meyeh sayeleh*	Cough, Catarrh, Dysphonia, Thoracalgia	Resin
Marrubium vulgare L.	*Farasyun*	Cough, Lung ulcers	Aerial parts
Mentha piperita	*Na'na*	Haemoptysis, Pleurisy	Aerial part
Myrtus communis L.	*Moord*	Cough, Haemoptysis, Thoracalgia	Fruit (concentrate)
Papaver somniferum L.	*Khashkhash*	Catarrh, Cough (warm)	Seed, oil (with honey)
Plantago ovata Forssk.	*Bazr-e ghatoona*	Pleurisy	Seed
Portulaca oleracea L.	*Baghlatol-hamgha*	Catarrh, Cough, Haemoptysis	Leaf, seed (with sugar)
Punica granatum L.	*Romman*	Cough, Dysphonia, Thoracalgia	Fruit (with almond oil)
Scilla maritima L.	*Sgheel*	Asthma, Cough, Dysphonia, Haemoptysis	Bulb (with honey)
Sesamum indicum L.	*Samsam*	Cough, Lung ulcers	Seed, oil
Trigonella foenum-graecum L.	*Holbeh*	Asthma, Cough (cold)	Leaf, seed
Urtica dioica L.	*Anjere*	Asthma, Cough, Orthopnoea	Leaf (cooked), Root, seed
Vicia faba L.	*Baghela*	Cough, Dysphonia	Fruit, flour (with oil/sugar)
Viola odorata L.	*Banafsaj*	Catarrh, Cough, Pleurisy, Pneumonia	Flower
Ziziphus jujuba Mill.	*Onnab*	Asthma, Cough, Dysphonia, Thoracalgia	Fruit

https://doi.org/10.24355/dbbs.084-201802161454

Table 2. Some *Laooq* formulations cited in Persian pharmaceutical texts.

Linctus (*Laooq*)*	Ingredients	Ailment(s)	Preparation
Almond (*Lawz*)[QA]	Liquorice (*Glycyrrhiza glabra* L.), Tragacanth gum (*Astragalus tragacantha* L.), Arabic gum (*Acacia senegal* Willd.), Almond seed [*Prunus dulcis* (Mill.) D.A.Webb]	Cough, Dysphonia, Laryngitis	The medicaments should be mixed with almond oil and then kneaded with rose syrup and starch (*Jullaab*).
Cabbage (*Kalam*)[QK]	Wild cabbage (*Brassica oleracea* L.), Grape (*Vitis vinifera* L.)	Dysphonia, Laryngitis	Decoction of cabbage should be mixed with grape juice and kneaded with honey.
Cottonseed (*Habol ghatan*)[QS]	Cottonseed (*Gossypium herbaceum* L.), Poplar fruit (*Populus* sp.), Fenugreek (*Trigonella foenum-graecum* L.), Linseed (*Linum usitatissimum* L.)	Catarrh, Dysphonia, Laryngitis	Components should be kneaded with grape concentrated juice after pounding.
Giant Thorny (*Tabaashir*)[CM]	Wheat flour (*Triticum aestivum* L.), Poppy seeds (*Papaver somniferum* L.), Liquorice extract (*Glycyrrhiza glabra* L.), Almond seed [*Prunus dulcis* (Mill.) D.A.Webb], Gum Arabic (*Acacia Senegal* Willd.)	Cough, Haemoptysis, Lung ulcers, Thoracalgia	All these medicines are powdered and sieved and then kneaded with frothless honey and cow butter.
Ginger (*Zanjebil*)[QS]	Ginger (*Zingiber officinale* Roscoe), long piper fruits (*Piper longum* L.), Saffron (*Crocus sativus* L.), starch	Dysphonia	Ingredient should be ground and mixed with starch. Mixture should then be boiled with honey until the desired consistency is achieved.
Harmal (*Esfand*)[TM]	Linseed (*Linum usitatissimum* L.), Harmal seed (*Peganum harmala* L.)	Cough, Dyspnoea	The ingredients should be pounded and then kneaded with honey.
Herb Hyssop (*Zoofaa*)[QG]	Herb Hyssop (*Hyssopus officinalis* L.), Gladiolus root (*Gladiolus communis* L.)	Catarrh, Cough (chronic), Dyspnoea	Ingredients are to be boiled in water. The extract should be sweetened with sugar and kneaded with honey subsequently.
Jujube (*Onnab*)[QK]	Jujube (*Ziziphus jujube* Mill.), Lasura (*Cordia myxa* L.), Raisin (*Vitis vinifera* L.), Liquorice (*Glycyrrhiza glabra* L.)	Bronchitis, Cough, Laryngitis	All ingredients should be decocted and kneaded with honey.
Linseed (*Kataan*)[QA]	Linseed (Linum usitatissimum L.), Frankincense (*Boswellia serrata* Triana & Planch.), Caraway (*Carum carvi* L.), Cardamom (*Elettaria cardamomum* (L.) Maton)	Cough (chronic), Dyspnoea	All medicaments are to be pounded and sieved and then kneaded with frothless honey.
Pediatric (*sebiaan*)[TM]	Liquorice (*Glycyrrhiza glabra* L.), Tragacanth gum (*Astragalus tragacantha* L.), Arabic gum (*Acacia arabica (L.) Willd. ex Delile*), Quince (*Cydonia oblonga* Mill.), Sugar	Bronchitis, Laryngitis	The quince mucilage should be mixed with other ingredients. The mixture should then be kneaded with honey or almond oil.
Rose (*Vard Ahmar*)[QG]	Rose flower (*Rosa* × *damascene* Mill.), Tragacanth gum (*Astragalus tragacantha* L.), Poppy seeds (*Papaver somniferum* L.), Giant Thorny (*Bambusa arundinacea* Retz. (Wang), Saffron (*Crocus sativus* L.), Liquorice (*Glycyrrhiza glabra* L.), Starch	Cough, Haematemesis, Pneumonia, Thoracodynia	Medicaments should be mixed and kneaded with grape concentrated juice.

* 1. *CM*: *Canon of Medicine* is one of almost 450 treatises written by Persian scientist and physician Ibn Sina [Avicenna] in 1024 AD. The book contains 5 volumes. In the last, Ibn Sina listed more than 300 compound formulations with comments on their application and effectiveness.

2. *QA*: *Qarabadin-e-azam* is a lithograph manuscript written by Hakim Azamkhan in 1853 AD which was organised based on pharmaceutical dosage forms. The book has an index having compound formulations in line with the diseases and body organs.[37]

3. *QG*: *Qarabadin-e-ghaderi* was organised by Ahmadshah Arzani in 1714 AD. The pharmaceutical dosage forms and the disease types are differentiated from head to toe. Dosage forms related to fevers and skin disorders are defined in the last part of the manuscript.

4. *QK*: *Qarabadin-e-kabir* is the largest Persian pharmaceutical manuscript that was written in 1772 AD by Seyyed Mohammad Hossein Aghili Khorasani Shirazi. Twenty chapters on pharmacy and pharmaceutical practice are organised in the first part followed by 28 parts on dosage forms based on active components alphabetically.

5. *QS*: *Qarabadin-e-salehi* was written by Mohammad Saleh Ghaeni Heravi in 1766 AD. It is a lithograph manuscript in traditional Persian pharmacy. Over 200 different pharmaceutical dosage forms involving preparation methods and related diseases have been mentioned alphabetically in the book. In the beginning part of the book a brief description of pharmaceutical basic foundations is given.

6. *TM*: *Tohfat ol Moemenin* is a comprehensive pharmacopoeia of simple and compound remedies in Persian which was written by Muhammad Mumin Daylami Tonkaboni in 1670 AD. The book contains 763 simple herbal, animal as well as mineral drugs followed by descriptions of compound remedies.

https://doi.org/10.24355/dbbs.084-201802161454

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https://doi.org/10.24355/dbbs.084-201802161454

Abkama, the first reported antibiotic in gastritis and infections throughout history

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Over the past century drug research has contributed the most to the progress of medicine, but the value of remedies used in traditional medicine as a source of drug discovery cannot be neglected. New techniques have enriched the standardisation armamentarium so that the traditional dosage forms could be used in today's system of medicine. Information on these dosage forms and preparations are found in manuscripts, namely *Qarabadins* (traditional pharmacopeias), which can be considered as a source of drug discovery in traditional medicine. In this paper, the historical basis of a traditional dosage form, *Abkama,* is discussed. *Abkama* is a liquid dosage form mentioned as an anti-infectious formulation in many traditional sources. Preparation of this formulation is considered in this paper as found in five most famous traditional Persian medical lists, including *Qarabadin-e-Salehi* (1766AD), *Qarabadin-e-Qaderi* (1714AD), *Qarabadin-e-Baghaee* (1861AD), *Tohfat-ol-Momenin* (1670AD), *Canon of Medicine* (1025AD) and *Qarabadin-e-Kabir* (1772AD). The term *Abkama* and its related preparation method and clinical uses were reviewed. Also, a literature search in PubMed, ISI and Google-scholar was done to find previous related investigations in this field. Based on these data, it appears that the method of preparation of *Abkama* is similar to the conventional fermentation methods for production of antibiotics. It can be considered as the first report of preparation of antibiotics throughout history.

Introduction

With the advancements of chemistry, pharmacology, biotechnology and the clinical sciences over the past century, drug research has played the most important role in the progress of medicine.[1] Records show that the use of plants as medicaments dates back to human antiquity.[2] What we know today as traditional medicaments are the medicinal plants and animal products that human beings have used as remedies for millennia.[3] Based on their long-term use, traditional remedies have an advantage in being selected as starting points in the area of drug discovery.[4] Any non-Western medical practice could generally be defined by the term traditional medicine.[5] According to the World Health Organization 60–80% of the world's population, mainly the developing countries, depended primarily on traditional medicines in the year 2002.[3] In western countries however, the interest and acceptance of traditional medicines is increasing.[6]

Asian governments are investing significant amounts of resources in screening programs of the Traditional Chinese Medicines with the hope that these clinical trials would lead to the development of new drugs.[7] Going through the world history of medicine undoubtedly one of the most influential systems of medicine is Islamic-Iranian medicine.[8,9] Recently there are studies indicating that experimentation in the field of medicine in its modern form, including clinical trials and drug-potency studies, has its roots in the Medieval Islamic era,[10] which shows the value of the surviving documents. There are thousands of manuscripts available from medieval Persia which could be used as sources to initiate drug discovery efforts. Although there are precise documents available, the great potential of this system of medicine remains neglected.

Qarabadin books are the traditional lists of a registry of drugs (pharmacopeias) containing methods of preparation of different traditional dosage forms and their uses.[11,12] There are many *Qarabadin* books available from medieval Persia. Once the literature is translated into today's language, the precise methods of preparation could be noted, which could be a good starting point in the development of new drugs. One of the formulas which could be observed in different *Qarabadins* was the *Abkame* dosage form, whose interesting features made us believe it can be used as an evidence-based starting point in drug discovery studies, thereby opening new windows to therapeutics. In this study, we report on the methods of preparation of Abkama, extracted from different *Qarabadins*.

Subjects and Methods

In this study six important traditional pharmaceutical manuscripts were examined to extract the required information about *Abkameh*, as below:

Qarabadin-e-Qaderi was compiled by Ahmadshah Arzani in 1714 AD. The pharmaceutical dosage forms were differentiated from head to toe in line with the disease types. Dosage forms related to fevers and skin disorders were defined in the last part of the manuscript.[13]

Qarabadin-e-Kabir is the largest Persian pharmaceutical manuscript, written in 1772 AD by Seyyed Mohammad Hossein Aghili Khorasani Shirazi. Twenty chapters on pharmacy and pharmaceutical practice form the first part, followed by 28 parts on dosage forms based on active components arranged alphabetically.[14]

Qarabadin-e-salehi was written by Mohammad Saleh Ghaeni Heravi in 1766 AD and is a lithograph manuscript in traditional Persian pharmacy. Over 200 different pharmaceutical dosage forms involving preparation methods and related diseases are described alphabetically in the book. At the front of the book is a brief description of pharmaceutical basic foundations.[15]

Tohfat-ol-Moemenin is a comprehensive pharmacopoeia of simple and compound remedies in Persian which is

https://doi.org/10.24355/dbbs.084-201802161454

written by Muhammad Mumin Daylami Tonkaboni in 1670 AD. In this book 763 simple herbal, animal and mineral drugs are described. The compound remedies are given in the following chapters.[16]

Qarabadin-e-Baghaee was organised by Mohammad bagha khan, an Indian physician who wrote this book in Persian and published in 1861AD. The book contains the common dosage forms of the writer's era in alphabetic order. The book has 12 chapters for each system of the body and the last chapter is about dermatology and cosmetics.[17]

Canon of Medicine. The fifth volume of the Canon *of Medicine*, the large medical encyclopedia which was written by Avicenna in 1025AD, is *Qarabadin* and specifies procedures for preparation of compound drugs.[18]

Also, a literature search in PubMed, ISI web of knowledge and Google scholar was done to find related previous investigations in this field.

Results

Methods of preparation of *Abkama*

Abkama is an ancient dosage form mentioned in the gastrointestinal section of most *Qarabadin* books. It was first invented by Chaldean and Egyptian people. The details of the methods of preparation of *Abkama*, based on five different *Qarabadins,* are listed in Table 1. All of these methods appear to have some general characteristics, which are summarised here:

> Bread is baked from fine barley or wheat flour and water, no salt or yeast is added and then it is ground along with specific herbs. All the ingredients are mixed with water or vinegar to make dough, which is placed under the sun in the summer for 20 days until it becomes black or green in color. Some liquid should be sprinkled on this mixture and it should be stirred at the beginning, middle and end of each day. Then, it should be dissolved in a solvent and placed in another container and kept for two weeks and shaken daily if effervescent, then kept still for the air bubbles to disappear. After two weeks it is filtered and the filtrate is collected and used for treatment.[13,15]

Is *Abkama* an antibiotic preparation?

The details in the preparation methods of *Abkama* suggest that *Abkama* may be an antibiotic. The process could easily be compared to what we know today as antibiotic production by fermentation.[19] The dough could be considered as the carbon source. In other methods of preparation of *Abkama*, such as those mentioned in the *Canon* of Avicenna, proteins have also been used as the starting substances,[18] which could also be considered as the carbon source of the antibiotic.[19] The black or green colour could be an indication of the presence of microorganisms in the mixture. The summer sun might be considered as the heat source, and stirring the system would insure even distribution of the nutrients and oxygenation of the system. Overall, this information suggests that *Abkama* is most likely an antibiotic preparation.

The other fact that makes one believe *Abkama* is an antibiotic formulation is its listed therapeutic uses. This formulation has been used orally in stomach disorders.[13]

Table 1. Methods of preparation of *Abkama* according to five Qarabadin manuscripts.

Qarabadin-e- Salehi (1766 AD) The warm fresh barley bread is put in a pottery container, covered until becomes green in colour, then ground and sieved. Dough is made using vinegar and put under the sun, kept moist by vinegar and grape juice each for ten days, dried under the sun, and tablets are made from the mass which are used later for the preparation of the formulation. For two months from 23rd of June to 23rd of August, these tablets (approximately 414g) should be placed under the sun in vinegar (approximately two kg), and a combination of herbs such as *Zingiber officinale* Roscoe, *Piper nigrum* L., *Cinnamomum zeylanicum* L., *Cuminum cyminum* L., *Bunium persicum* (Boiss.) B. Fedtsch. and *Eugenia caryophyllata* Thunb should be added.[15]
Qarabadin-e- Qaderi (1714 AD) Dough is made from approximately 420g of fine barley or wheat flour and water, no salt or yeast is added. It should be baked and the bread ground with 420g of powdered *Mentha pulegium* L., approximately 60g of salt, 105g of *Bunium persicum* (Boiss.) B. Fedtsch. and 420g of *Pimpinella anisum* L. All the ingredients are mixed with water to make a dough, which should be placed under the sun in the summer for 20 days untill it becomes black in colour. Some water should be sprinkled on this mixture, and it should be stirred in the beginning, middle and end of the each day. Then, it should be dissolved in water and placed in another container and kept for two weeks and shaken twice a day, in the morning and night. If effervescent, it should be kept still for the air bubbles to disappear. After two weeks, it is filtered and the filtrate is collected in another container. The residue is subjected to the same process for two more times, and the second and third filtrate is mixed with the first.[13]
Qarabadin-e- Baghaee (Published 1861AD) Both of the above methods are mentioned.[17]
Tohfat-ol-Momenin (1670 AD) In the summer time, bread should be baked from barley flour and *Mentha pulegium* L., then ground and mixed with an equal weight of *Mentha pulegium* L. and salt and a quarter of its weight of *Foeniculum vulgare* Mill. Few other herbs might be added according to the nature of the disease. Dough is made from the mass using water and kept under the sun for 20 days, stirred every day and kept moist until it becomes black in colour. The black mass should be dissolved in water, placed in a glass container and kept under the sun for few days.[16]
Qarabadin-e-Kabir (1772 AD) Same as *Tohfat-ol-Momenin*[14]

https://doi.org/10.24355/dbbs.084-201802161454

It is only recently that we know the role of *Helicobacter pylori* in the mediation of gastric disorders.[20] It has also been used as an enema for the treatment of intestinal ulcer[17] and as an anthelmintic formulation.[16] Other therapeutic applications of *Abkama* are as a gargle for treatment of tonsil inflammation,[14] topically for the eradication of *ghorooh al khabisa* (meaning creeping ulcers), which are defined as wounds with a warm feeling and secreting a watery substance, and for the treatment of rabid dog bites.[21] It has been used in the form of eye-drops as a prophylaxis for smallpox damage to the eye.[18] Another therapeutic use of this formulation is in the treatment of obesity.[16] Today it is proposed that an environmental factor that regulates obesity is intestinal microorganisms.[22] According to recent investigations, a change of saliva bacterial species in overweight women could be considered as a biological indicator of developing an overweight condition.[23]

Conclusion

What can be concluded from *Abkama's* various medical applications is that this dosage form has been used in the treatment of many infectious diseases in general. And also it indicates that centuries before the discovery of micro-organisms and antibiotics, the role of these were in a way understood as a cause and cure of what we know today as infectious diseases.

Interesting concepts are realised through this research, such as although the role of *Helicobacter pylori* in gastritis was revealed by two Australian scientists, RJ Warren and BJ Marshall in 1983,[20] in medieval Persian medicine some kinds of gastric disorders were categorised with other infectious diseases. Today, obesity is not categorised under infectious diseases but recent findings show a possible role for micro-organisms in developing some forms of overweight conditions, which could also be observed in Traditional Persian categorisations. *Abkama's* formulation and application could be a potential research area for biotechnologists, pharmacologists, chemists and clinical researchers.

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https://doi.org/10.24355/dbbs.084-201802161454

Book Review

Herbs and Healers from the Ancient Mediterranean through the Medieval West: Essays in Honor of John M. Riddle

Anne Van Arsdall and Timothy Graham (Editors)
Farnham, Surrey: Ashgate, 2012, pp.394. ISBN 978-1-4094-0038-7 (hardback price: £70.00).

Many scholars now believe that the medicine practiced during ancient and medieval times has been greatly underestimated, and that practitioners' knowledge of medicinal plants and their rational use was much more sophisticated than previously thought. As a result there is much research currently underway by historians, plant biologists and others to see if there are further secrets to be unlocked.

One of the pioneers of this research is John M Riddle at the University of North Carolina. Riddle's books include *Dioscorides on Pharmacy and Medicine* (1985) and *Eve's Herbs: A History of Contraception and Abortion in the West* (1997). This book, a compilation of essays on subjects close to Riddle's heart, is the fourth in Ashgate's 'Medicine in the Medieval Mediterranean' series. The book takes a broad historical sweep, from the first century BC to the late Middle Ages, and has a wide geographical spread, from central Asia to western Europe. The opening chapter, by John Scarborough, provides a scholarly account of pharmacology and toxicology at the court of Cleopatra (around 70 to 30BC). It describes the roles of several of her physicians, including Philotas of Amphissa and one called Olympus who was present when the queen committed suicide.

Other colourful characters featuring in this book include the healers Gariopontus of Salerno and Constantine the African. The latter was an eleventh century monk, the importance of whom in the history of European medicine can hardly be over-stated, as Winston Black demonstrates. Black suggests that Constantine should be credited with bringing rationality back into medieval medicine, as a result of his translations of Arabic and Greek medical works, along with original contributions.

Black examines the influence of one of Constantine's key works, his *Liber Graduum* (the book of degrees), the earliest medieval text in Latin to embrace Galen's theory of simples. Black explores references to Constantine in north European medical verse. In another chapter, Faith Wallis discusses the reasons why the *Liber Graduum* never gained admission to the Articella (the medieval compilation of medical texts), but nevertheless had a significant impact upon it.

In his chapter John Crellin reflects on Riddle's *Eve's Herbs,* and on interpreting evidence about therapeutic effectiveness. Maria Amalia D'Aronco, editor of *The Old English Illustrated Pharmacopoeia,* examines attempts to identify the plant known as *elehtre*; it is usually considered to be the lupin because of its colour (amber or *electrum*). The ubiquity of herbs and herbal healing in the medieval world is illustrated by the extent to which they were satirised in Middle English texts, explored in a chapter by Linda Ehrsam Voigts. And Karen Reeds assesses the claims for Saint John's Wort in the age of Paracelsus. She notes that the glandular dots in its leaves are so distinctive that any description or picture that involves them can reasonably be assumed to be *Hypericum perforatum*.

The final chapter provides a review of existing resources available to researchers, including the Anglo-Saxon Plant Names Survey (ASPNS) and the Dictionary of Old English Plant Names (DOEPN). It then describes the development of an important new internet-based system to facilitate collaboration, the Medieval Plant Survey (MPS). This data base includes not only plant name indices listing nearly 10,000 plant names, but also large numbers of historical texts, ingredients mentioned in medical formularies, and online sources.

Some parts of the book are, however, less readily accessible than others; some 24 pages of Latin text are reproduced in full, and one chapter (on fifteenth century Silesian manuals for treating battlefield wounds) is in German, although a short abstract is provided in English. There are some 26 pages of tables providing detailed lists of substitutes, part of a chapter in which the author revisits the practice of substitution in ancient pharmacy. A further 16 pages provide tables giving the alternative terminology used in four important manuscripts from this period, including the *Circa instans*.

This then is a scholarly work which will be of considerable interest to researchers working in this field, including historians and plant biologists. But the book also offers much of interest to pharmaceutical historians. It makes important contributions to our knowledge about how medical and pharmaceutical ideas moved across national, linguistic and cultural borders; about how they were translated, modified, adapted and improved, between Greek, Latin and Arabic; and about how they came to lay the early foundations for pharmacy in Britain.

The book shows also that Anglo-Saxon medicine had a rational basis and elaborated the medical tradition of classical antiquity. There are many examples in ancient botanical tradition of identical names denoting different plants, and conversely of different names being attributed to the same plant. Whilst the names of herbs have proved prone to change over time, their medicinal uses tend to remain remarkably constant over millennia.

Those with an interest in the history of plant medicines will thus find much to interest them in the contributions in this book. But it also illustrates that, when it comes to the history of herbs and healers, there is still much to do. Pharmaceutical historians have already made important contributions in this field, but there are many further insights they will be able to provide.

Dr Stuart Anderson

https://doi.org/10.24355/dbbs.084-201802161454

Letter to Editor

Origin of Bezoar or *Pāt-zahr* in Persian Medicine

I saw an interesting article entitled 'Porcupine Stones' by Dr Christopher J Duffin in the last issue [43(1)] of *Pharm Hist (Lond.)*[1] As he mentioned, Bezoar has a root in the Persian language. According to the Webster dictionary, the origin of this word is 'Middle French, from Medieval Latin, from Arabic dialect *bezuwār,* from Arabic *bāzahr,* from Persian *pād-zahr,* from *pād* protecting (against) + *zahr* poison.'[2] It was originally *Pāt-zahr in* ancient Persian and was changed to bezoar when it went to the West; therefore I thought a brief historical description about this word would be interesting for readers and researchers of the history of pharmacy.

Pāt-zahr was an ancient Persian word. In Sassanid Pahlavic language, the official language of Persia in Sassanid dynasty (224-637 AD), *pāt* means anti and *zahr* means poison. Therefore *Pāt-zahr* means anti poison or antidote.[3] In Traditional Persian Medicine, *Pāt-zahrs* were a group of drugs with antidote activity including mineral (stones) and animal ingredients. Herbal antidotes were called *Teriaq.*[4] In *Makhzan-ol-Advieh* (Storehouse of Medicaments, a late medieval Persian manuscript), the mechanism of action of bezoars and *Teriaqs* were described as absorbing poisons to the antidotes and also deactivation of poisons effects by antidotes.[4] The most famous *Pāt-zahr* in ancient Persia was derived from the stomach of a kind of goat, namely *boz e padzahr saz* (bezoar goat) (Fig. 1). This goat (Persian Wild Goat, *Capra aegagrus*) is called as *Kri-kri* in Greek[5] and *Pāzan* in Persian.[6] It seems that the mass derived from its stomach made from indigestible materials such as hair possesses antidote activity. Goats' hairs were cut off by herbal thorns in their pasture and they eat them. These hairs and other indigestible materials became stone-like masses in their stomach. These masses have antidotal properties, probably by absorbing poisons in the stomach.

In its passage to the West, its meaning was changed over time and nowadays bezoar is described as 'a ball of swallowed foreign material (usually hair or fibre) that collects in the stomach and fails to pass through the intestines'.[7] The relation between the current meaning of bezoar and its origin can be clarified by this explanation: Bezoars made from hairs and other things in the stomach are like *Pāt-zahr* made in goats' stomach by hair and indigestible materials.

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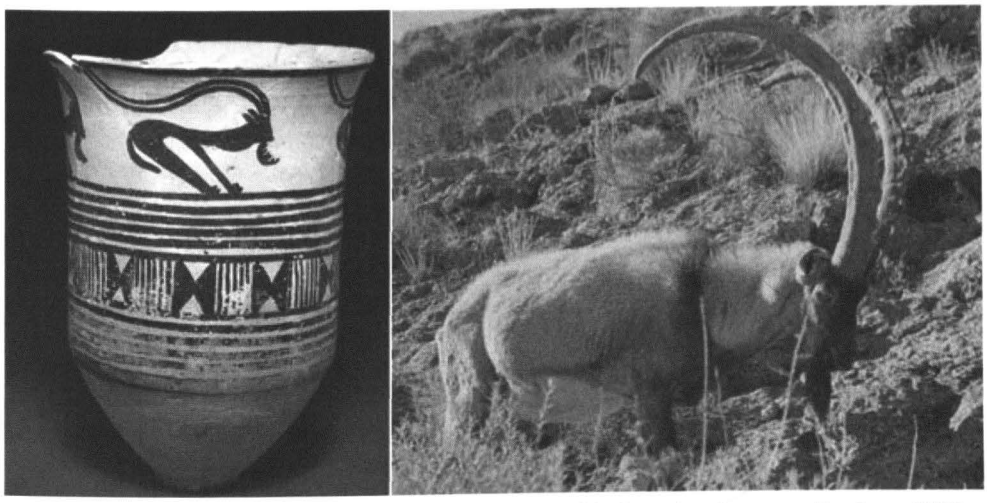

Figure 1. *Left:* beaker with bezoar goat painting, found in Susa (southwestern Iran), ca. 3500 BC, kept in McClung Museum of natural history and culture, Knoxville, Tennessee; *right:* a bezoar goat..

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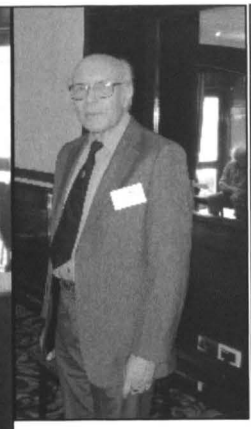
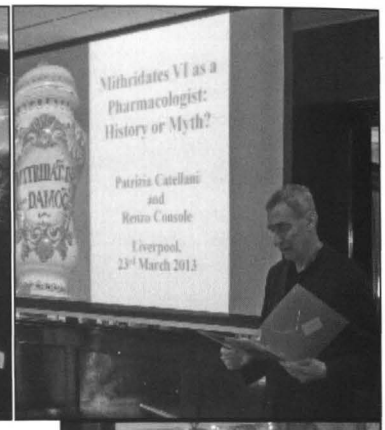
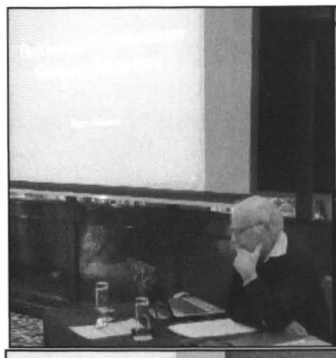
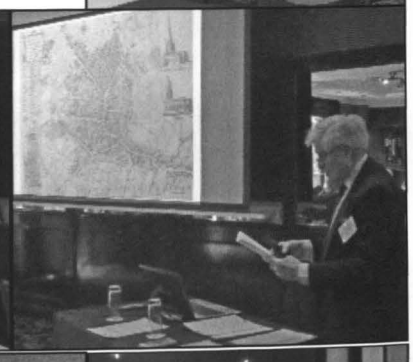


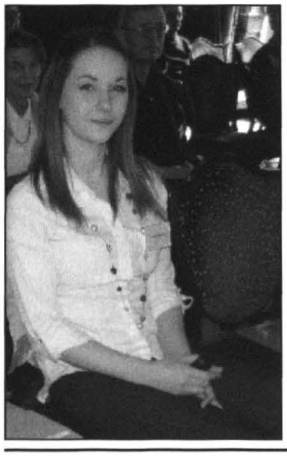


BSHP Annual Spring Conference, 22-24 March 2013
at the Alicia Hotel, Liverpool

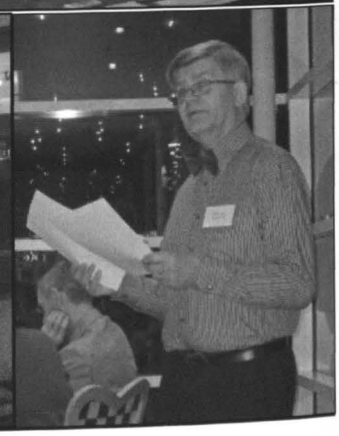
From above, *clockwise:* BSHP members; speakers - Ainley Wade, giving Peter Worling's paper on 'Evans Medical, Speke' ; Renzo Console on 'Mithridates VI as a pharmacologist'; Peter Homan on 'Auxiliary trades added income for the pharmacy'; Michael Jepson on 'Remember Philip Harris, Southall's and Alfred Bird?'; Roy Allcorn asking quiz questions after dinner; Anna Roos on ' A whiff of alchemy: early modern conceptions of smelling salts'; Stuart Anderson on ' The Liverpool Apothecaries Company'.
Photos: Peter Homan







Sarah Trenham, *left*, a pharmacy student at Cardiff University, gave the Burnby Award Lecture on 'The history and development of Chlorpromazine'.



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Complete volumes of four issues: Volume 38 (2008); Volume 39 (2009); Volume 40 (2010); Volume 41 (2011); Volume 42 (2012). Each volume available for £8 UK or £10 Overseas (including post and packing).
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Orders to: Peter Homan, 3 The Ridings, Epsom, Surrey, KT18 5JQ Tel: (+44) (0)1372-723001. *Email*: p.g.homan2@btinternet.com (**note** changed email address) Cheques, Banker's Orders, etc. to be made payable to the British Society for the History of Pharmacy. Payment can only be accepted in Pounds Sterling.

ISSN: 0079-1393 Indexed in Medline as Pharm. Hist. (Lond.)

Typeset and Produced by Ralph Allen Press Ltd, Bath BA1 3EN

https://doi.org/10.24355/dbbs.084-201802161454

PHARMACEUTICAL HISTORIAN

Vol. 43 No. 3
September 2013

British Society for the History of Pharmacy
Q House, Troon Way Business Centre, Humberstone Lane,
Thurmaston, LEICESTER LE4 9HA

Founded 1967

https://doi.org/10.24355/dbbs.084-201802161454

British Society for the History of Pharmacy

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Tel: 0116 274 7355, Fax: 0116 274 7365, Email: bshp@associactionhq.org.uk
Website: www.bshp.org

The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.

An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.

Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*

Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

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Four issues of the *Pharmaceutical Historian.*

Regular meetings, with guest speakers, usually in November, February and May.

Visits to places of historic interest, museums, collections, botanical gardens, etc.

Annual Conference, usually in March/April.

Free use of the Royal Pharmaceutical Society of Great Britain's library facilities for research.

Help in historical research and with the identification of artefacts.

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Application forms are available from the Honorary Secretary at the address above or on *www.bshp.org*

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https://doi.org/10.24355/dbbs.084-201802161454

PHARMACEUTICAL HISTORIAN

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Q House, Troon Way Business Centre, Humberstone Lane,
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Contents

Diary

Please note that evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated.

Monday 7 October 2013
'The History of the Square' by Briony Hudson, BSHP President, at Lambeth.

Wednesday 6 November 2013
Joint meeting at *Cardiff University*. 'Back to Cleopatra's Kitchen: what I have learnt from experiments with ancient remedies' by Laurence Totelin, 5.45 for 6.30. Details later.

Monday 10 February 2014
'A History of Inhalers'. Details later.

Future dates
12 May 2014

BSHP Annual Spring Conference 2014 BIRMINGHAM

CALL FOR PAPERS AND POSTERS

The annual conference 2014 will be held from Friday March 28th to Sunday March 30th at the Best Western Westley Hotel, Westley Road, Acocks Green, Birmingham, West Midlands, B27 7UJ. The price is being held at last year's level of £300 all in.

The hotel is situated on the outskirts of Birmingham, yet only minutes from the city centre, the NEC station and the airport.

As usual, Saturday afternoon will be free. Birmingham has several world-class art galleries and museums but also has an interesting canal system. If you would be interested in a canal tour, perhaps you could e-mail me your interest so that I can explore exactly what is available to put on the booking form in December.

Taking our cue from the National proposals to mark the centenary of WWI we are proposing that the theme for this conference should be 'Pharmacy in War', whether it be historical wound treatments, battlefield surgery or personal experience as a pharmacist in Her Majesty's Forces. Contributions on any topic welcome but, if we are oversubscribed, papers with a link, however tenuous, to war or our venue, Birmingham, will be given priority. Presenters are usually given 25 minutes which should include time for questions. Posters can be any size and either landscape or portrait format.

If you would like to present a paper please let Shirley Ellis have a preliminary title by the end of October. If you have a longer paper which is of particular relevance please contact her to discuss timing. If you would like to bring a poster please indicate this on your application form.

Dr S Ellis, 1 Willow Way, Bottisham, Cambridge. CB25 9BS or e-mail shirleyellis@shirlellis.plus.com

Notice

Drs Hardy and Rollinson, the authors of the paper on page 53, 'A chemical study of two late 19th century skin medicines' would like to collaborate in the future with someone/small laboratory that has the analytical techniques of FTIR (Fourier Transform Infra-Red spectroscopy) and GC-MS (Gas Chromatography-Mass Spectroscopy). They would need someone who could collect data, *and* also interpret it. They have only small funding monies, but could offer as an 'alternative payment' joint authorship of any later published papers. If anyone reading this is interested in such a collaboration then please contact one of the authors of the above paper as soon as possible. For addresses, see p. 57.

https://doi.org/10.24355/dbbs.084-201802161454

History of the external pharmaceutical use of Amber

Dr Christopher J Duffin
Sutton, Surrey

Amber is an organic gemstone with a long folklore pedigree. Known from deposits ranging from Late Triassic[1] to Miocene in age, the most familiar examples today are from the Oligocene/Miocene of the Dominican Republic[2] and the Eocene of the Baltic area.[3] In classical times amber was deemed remarkable because of its low density, thermal properties and ability to hold a static charge.[4] The colour was pleasing and distinctive, it was easy to work and it also was possible to polish the stone. In north-west Europe and Mediterranean countries, a brisk trade grew up with the Baltic area,[5] such that amber artefacts are found at archaeological sites in an almost unbroken timeline from Roman through Anglo-Saxon, Mediaeval and Renaissance times to the present day.

Explanations for the origins of the stone were wide-ranging and varied in classical and mediaeval times. Some thought it represented the congealed rays of the setting sun, the Roman poet Ovid recorded a Greek myth that amber droplets were the tears of the Heliades (daughters of Apollo mourning the death of their brother Phaeton), and Pliny records Sophocles' opinion that certain birds in Africa shed amber beads in their faeces.[6] Roman and Greek mythology cite the golden apples of the Hesperides, covered in amber dew, while Lithuanian legends recount that amber washed up on the shores of the Baltic Sea is all that remains of an amber palace destroyed by Perkunas, the god of thunder.[7]

In reality, amber is fossilised resin. Resins are viscous liquids exuded by a range of trees, especially cycads, junipers and conifers, containing a range of complex hydrocarbons, particularly volatile fluid terpenes and occasionally essential oils. The volatile components make the resin strongly and often distinctively aromatic; as they evaporate, the resin becomes more viscous and gradually hardens. The resins are secreted from special resin glands in the cortex of the tree as lightly antiseptic, protective fluids. Modern resins exploited for their various chemical and physical properties include Gum Arabic (obtained from sub-Saharan species of *Acacia*), Frankincense (from trees of *Boswellia*) and Myrrh (from the myrrh tree, *Commiphora myrrha*). Following burial, terpenes continue to be liberated, and complex polymerisation of residual hydrocarbons under increasing pressure and temperature leads to the formation firstly of copal, and eventually amber.

Amber has a long history of medicinal use from classical times to the present. Uniquely amongst those geological materials with historically pharmaceutical applications, it was prepared in a wide number of ways and prescribed for a huge range of disorders. This paper gives a brief review of the external application of amber in relatively unmodified form in medicine.

Amulets

In its modern sense, 'amulet' refers to an object endowed with magic powers which are persistent in protecting the bearer's person or belongings from evil spirits or the Evil Eye. It is obvious from Pliny's *Historia Naturalis* however, written sometime shortly before the Roman official's death in 79 AD, that the original Latin name extended to objects which preserved the bearer from troubles, including those of supernatural origin, as well as having medical or prophylactic properties.[8] Pliny (Fig. 1) refers to the amuletic powers of amber thus:[9]

> Even today, the country women of Lombardy and those along the Po wear necklaces and collars of amber beads, mainly to adorn themselves, but in part also for their own health; for they believe that it prevents the inflammation of the tonsils and other diseases of the throat and the pharynx;

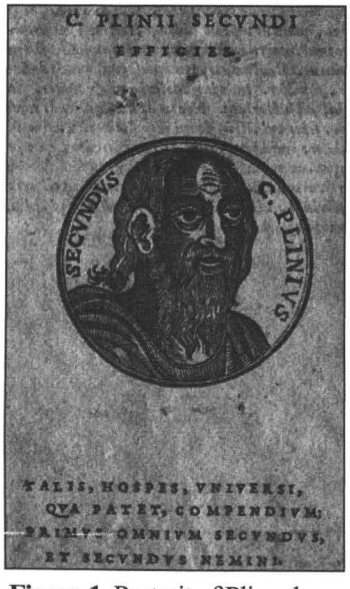

Figure 1. Portrait of Pliny the Elder (AD 23-79). Reproduced by kind permission of the Wellcome Library, London.

Figure 2. Portrait of Albertus Magnus (1193 or 1206 – 1280). Line engraving by T. de Bry, 1597. Reproduced by kind permission of the Wellcome Library, London.

Figure 3. Portrait of Jan Baptist van Helmont (1579-1644). Wikimedia Commons.

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for the people of that region are subject to goitre, about the fleshy parts of the throat, caused by the local water which breeds the disease. It is, however, true that a necklace of amber beads worn about the necks of little babies is a great protection against secret poisons and a countercharm against witchcraft and sorcery. Callistratus says that such necklaces are good for all ages, to preserve the wearer from fantastic illusions and fears that drive one out of his senses: further, amber, whether taken in drink or hung about one, cures strangury … He says of this yellow amber that if it be worn as a collar about the neck it cures fevers and heals diseases of the mouth, throat and jaws.

Around 1262, Albertus Magnus (?1193-1280; Fig. 2), the famous Dominican Friar and philosopher, recommended the wearing of amber in order to help maintain chastity, and to ease difficulties during childbirth,[10] advice reiterated by Matteo Silvatico,[11] the famous doctor of the Salerno School (circa 1285-1342) in his medical compendium. Felice Passera (1610-1702), a Capuchin monk from the Brescia Infirmary suggested that amber should be worn as a necklace or collar, or carried in some way in order to impede conditions of the head and throat.[12] The carrying of an amber amulet, often on the wrist, was seen as a sensible precaution by Passera against catching the plague. It was also believed to have spiritual efficacy against every evil; when worn tied to the collar by young boys it was effective against spells and enchantments, sorceries ('maleficij') and demons, subduing all evil spiritual influences including those causing night-time fears.

These themes are also embodied in amber amulets collected and reported from 20th century Spain and Italy by Walter Hildburgh (1876-1955). Necklaces of smooth and faceted amber beads were there used as prophylactics for teething problems, as well as to protect against injury caused by 'fascinación'.[13] In addition, a faceted amber bead strung together with a bead of milky glass was worn by Basque women in order to protect them against disorders of the breasts. Furthermore, the wearing of an amber necklace 'assuredly cures that most torturing pain called the cramp … as many thousands have experienced', as well as being efficacious against soreness of the eyes.[14]

Camillus Leonardus, 16th century physician to Caesar Borgia, notes that 'If laid on the left Breast of a Wife when she is asleep, it makes her confess all her evil Deeds'. Amber supposedly also 'fastens teeth that are loosened' and has the noteworthy property of being able to identify an adulterous spouse:[15]

If we would discover whether a Woman has been corrupted, let it be laid in Water for three days, and then shewn to her, and if she is guilty, it will immediately force her to make water.

The very threat of plague encouraged the use of many hopeful prophylactics and remedies. The Flemish chemist and physician, Jan Baptist van Helmont (1579-1644; Fig. 3) espoused the idea of utilising the magnetic powers of stones to cleanse the body of toxins. The disease itself was believed to enter the body by virtue of a form of magnetism:

in time of the plague, he draws in, through the invisible pores of the skin, the pestilential Atomes exhaling from the infected. For Nature, which at all other times is wont to admit nothing but wholsome and alimentary juice, and with great diligence and exactness to sequester that juice, from the inalimentary and excrementitious parts of it; at this time, yeelding and wholly submitting to its magnes, greedily sucks in the pestiferous aer, and invites death into the inmost closet of life.[16]

As a defence, van Helmont recommended the wearing of 'preservatory' amulets of emerald or amber which, by virtue of their durability are 'too hard for the humane magnes' and thereby 'conquer and destroy his attraction, and by that superiority of attraction, become the most certain … Counterpoisons to the fatal contagion of this plague'.

Although often taken internally, especially as Oil of Amber, for various 'cold disorders of the brain', the external use of amber for a variety of nervous disorders was still being proposed as late as the mid-nineteenth century. 'Mademoiselle V' suffered from a convulsive disorder for over 14 years and was treated by a Dr Gérard. He found that, by getting her to wear an amber necklace weighing 70g, he was able to prevent the convulsions that were taking place throughout her body. His experimental approach indicated that this treatment was effective only if she wore the necklace at the base of her neck; if she lay it over her clavicles, or moved it to just beneath her lower jaw, the symptoms reappeared. On replacing it in the optimum therapeutic position, her tremors ceased within a matter of 3 or 4 seconds. Gérard, highly encouraged by his success in this case, promptly set about trying to identify whether amber might be used in a similar fashion in the treatment of related diseases. Unfortunately, he found that there was no relief in cases of epilepsy, sciatica, or cramp. A patient with extreme nervous depression did record some improvement, but the fact that he prescribed opium concurrently with the wearing of the necklace may have been significant. Gérard gave a thirteen year old girl a necklace to wear in the wake of a three-week long bout of chorea, but the doctor noticed no improvement in her condition, even after wearing the necklace continuously for a period of 10 years. Gérard was reluctantly forced to admit that the successful treatment of Mlle V. using an amber necklace, although noteworthy, was a unique case; he supposed that her favourable response to contact with the amber beads about her throat might be indicative of a unique susceptibility to terrestrial electric fields.[17]

GF Kunz (1856-1932), the esteemed mineralogist of Tiffany & Co., recounts an example of contemporary belief in the efficacy of amber beads.[18] Reputedly living to 106 years old, a Jewess of Russian extraction living in the USA ascribed her longevity to the wearing of a necklace of large amber beads. She was given the beads by her mother, another centenarian. The Jewess apparently died a few days after passing the necklace on to her own daughter.

Amber amulets were also carried against ocular ailments, particularly in Scotland. The MacGregors of Glencoe kept four beads as a charm against blindness, whilst in the north east of the country wearing such 'lammer' beads was deemed to afford a cure for sore eyes as well, in Tweedside, as sprained limbs. In the same area, one such bead was regularly used to clear chaff and other

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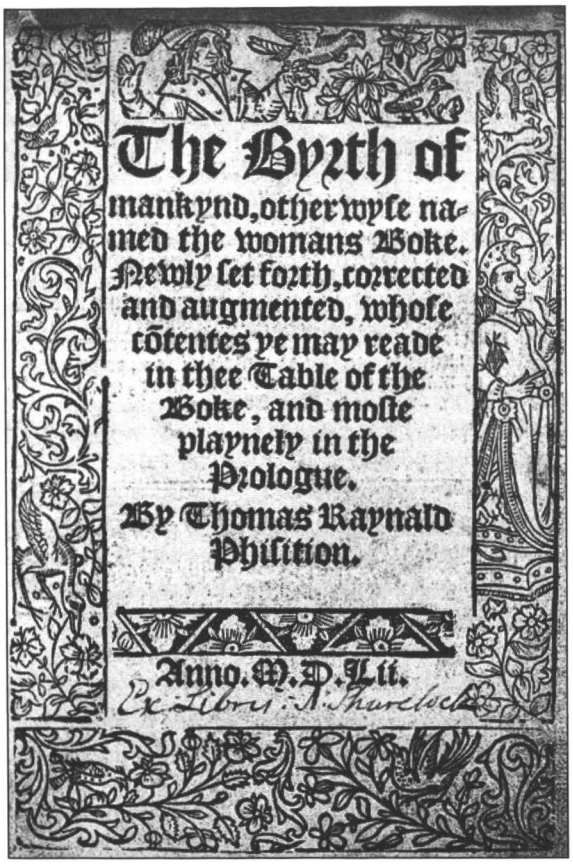

Figure 4. Title page of *The byrth of mankind* (London, 1552), translated by Thomas Raynald from an original work by Eucharius Roesslin, the Elder. Reproduced by kind permission of the Wellcome Library, London.

foreign bodies from the globes of the eye of both humans and livestock. Also, an eighteenth century smuggler from Galloway wore an amber bead which he used for curing sick children, diseased cattle and other sick animals; treatment involved dipping the bead three times into water, which was then given to the sick person or animal to drink.[19]

Pessaries

Thomas Raynald (fl. 1539-1552) the 16th century Oxford printer and physician, suggested a radical treatment for excessive menstrual bleeding in his volume entitled *The Byrth of mankind* (Fig. 4). The patient was to be tied up in a carefully prescribed manner, and a cupping glass placed on the untreated ventral abdominal surface. At the same time, a variety of ingredients was inserted into the vagina in order to stem blood flow, as follows:[20]

> Fyrst then to stynte and restrayne the outragyous fluxe of flowzes, it shall be very good to bynde the armes strayghte and strongelye, and not the feete or handes, as some unwise men do teache, and then to set a ventose, boxe, or cuppynge glasse with fyre (whyche is called boxinge) under the brestes without any scarafication: laying on also lynnen clothes dipped in vynegre on the belly between the navel and the secretes: conveyinge also into the places soche thynges which have vertue to restrayne blood: as the flower and rynde of pomegranate, amber, terra sigillata, bole armeniacke, sanguis draconis, hematites, the red rose, white frankincense, & galles: al those thinges or as many of them as ye can conveniently gette: beate them into powder in lyke portion, and temper them with red wyne, making of it a plaster, the which so tempred put into a little round bag the quantitie of a mans thombe, the which she shal put into the privie partes.

Figure 5. Portrait of Nicolás Monardes (1569). Wikimedia Commons.

Plasters or salves

Nicolás Monardes (1493-1588; Fig. 5), the Spanish botanist and physician, recommended amber for inclusion in a 'Stomatick Emplaster' which 'stays Vomiting, strengthens the Stomach, helps Digestion, causes Appetite and expels Wind'. The other ingredients in this preparation were tacamahaca (a balsamic resin obtained from various species of North American and East Asian poplar trees), Storax (aromatic, resinous exudate of the Mediterranean Turkish Sweetgum Tree, *Liquidambar orientalis*) and 'Oyl of Mastich' (resin of the low, shrubby Mediterranean tree, *Pistachia lentiscus*).[21]

A 'Diaphoretick Emplaster' is credited to the German alchemist, Adrian von Mynsicht (1603-1638; Fig. 6). In addition to 'yellow Amber', this contained yellow wax, solidified coniferous resin ('colophony'), and a host of aromatic gums and resins (gum Bdellium from *Commiphora* spp.; gum ammoniac from *Dorema ammoniacum*; Galbanum from *Ferula* spp.; Juniper Gum, Mastic and Frankincense), mostly dissolved in vinegar and mixed together in turpentine. The efficacy of the salve in drawing out 'flegm' was demonstrated by the drops of 'watery humors' which remained on the plaster when it was removed from the skin surface. It was recommended in cases of sciatica, gout, 'Flegmatick Tumours from the French Disease' (syphilis – probably the wart-like lesions developed during the secondary stage of the disease), swelling of the feet, broken and dislocated bones, pains, bruises, and scurvy.[22]

https://doi.org/10.24355/dbbs.084-201802161454

Figure 6. Portrait of the German alchemist, Adrian von Mynsicht (1603-1638). Reproduced by kind permission of the Wellcome Library, London.

Figure 7. Portrait of William Salmon (1644-1713). Line engraving by W. Sherwin, 1671. Reproduced by kind permission of the Wellcome Library, London.

Figure 8. Portrait of Georgius Agricola (1574). Reproduced by kind permission of the Wellcome Library, London.

Poultices or cataplasms

William Salmon (1644-1713; Fig. 7) was a prolific 17th century author who published on everything from medicine, surgery, anatomy and pharmacology, through astronomy, gardening, cookery and astrology to religion. Although using the title 'M.D.', there is some doubt over his qualification, and there is a suspicion that he was a 'dishonest practitioner or charlatan'. He recommends a cataplasm containing amber, yeast, nutmeg, mint, cloves, cubebs, (fruits of the Pepper, *Piper cubeba*), xylo-aloes (a rather exotic aromatic wood from Indonesia), all mixed together in wine vinegar. Warmed and repeatedly applied to the crown of the head, it supposedly helped 'palsy of the Tongue' (a rare disease caused by lesion of the hypoglossal XII nerve[23]), 'giving it Motion and Speech', as well as acting as a catarrhal decongestant.[24]

Rulandus (Martin Ruland the Elder; 1532-1602) favoured a cataplasm against catarrhs and 'Flux of the Rheum', applied to the crown of the head after it has been shaved, and consisting only of strong yeast and powdered amber.

Fumigant

Albertus Magnus (circa 1262) recommends the burning of amber in order to drive away serpents, much as jet (Gagates) was utilised in classical and mediaeval times,[25] while Camillus Leonardus notes that inhaling the fumes of burnt amber cures epilepsy.[26]

Following a long discussion on the origins of amber, Georgius Agricola (also known as Georg Bauer, 1494-1555; Fig. 8) states that, in addition to being used as a replacement for incense as a fumigant for 'clearing fetid or contaminated air', burnt in lamps to obtain a brighter and longer-lasting flame, cast onto funeral pyres, and used as an ingredient in ink:[27]

> In medicine it has the property of coating and having been drunk stops bleeding no matter where it occurs. It will stop vomiting, flux of the womb, discharge from ulcers, head discharges, and cure tonsillitis and throat irritations. It strengthens the viscera and other parts of the body. Since it is sweet smelling it is good for the heart and will stop heart tremors. The fumes of white amber will drive away epilepsy. So much regarding European amber.

Thomas Raynald takes up the theme of its beneficial use in childbirth and gynaecological problems in an English translation of Eucharius Roesslin's (1513) *Der schwangeren Frawen-und hebammen Rosen garten*. He recommends putting amber on the embers of a dying fire 'to sussume the nether places' because the fumes 'yelde a goodly savoure, by the which the nether places open theym selfe, and drawe downewarde'.[28]

Salmon recommends taking powdered amber in a quarter of a pint of white wine every day for a week in order to treat falling sickness (epilepsy). For the rather different 'fundament-falling' (presumably rectal prolapse) he recommends to 'take bits of amber, and in a colsestool put them upon a chafing dish of live charcoal, over which let the patient sit, and receive the fumes'.[29]

The Scottish physician and author, William Buchan (1729-1805; Fig. 9) commends the use of amber vapour as an inhalant 'when the nose abounds with moisture'. He goes on to suggest the use of a 'snuff made of the leaves of marjoram, mixed with the oil of amber, marjoram and aniseed' for 'moistening the mucus when it is too dry'. In the event that the 'nerves which supply the organs of smelling are inert', he suggests anointing the forehead with balsam of Peru mixed with a little oil of amber. The former simple is the resin of the leguminous Peru Balsam or Tolu tree (*Myroxylon balsamum),* which is still used today on account of its well established antiseptic properties.

Herman Boerhaave (1668-1738; Fig. 10), the famous Dutch botanist and physician based at the University of Leiden, recommends an unusual treatment for rickets. He suggests beating an ounce each of amber, incense, Mastic, Benzoin (aromatic balsamic resin obtained from trees of

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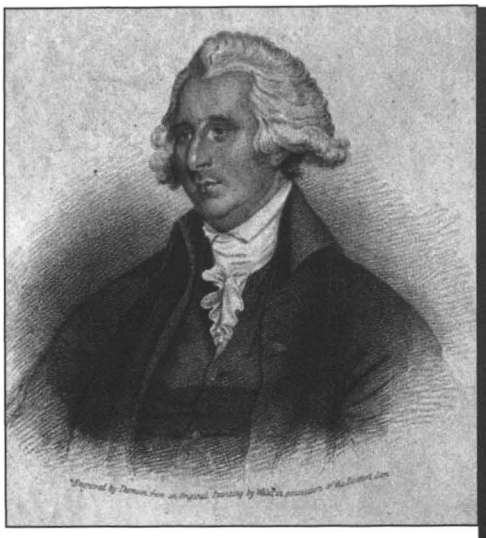

Figure 9. Portrait of William Buchan. Stipple engraving by J. Thomson after J. Wales. Reproduced by kind permission of the Wellcome Library, London.

Figure 10. Portrait of Herman Boerhaave (1668-1738). Mezzotint by G. White. Reproduced by kind permission of the Wellcome Library.

Figure 11. Portrait of William Bullein (died 1576). Copied from a woodcut prefixed to his *Government of Health* (1559), rendered by W. Richardson in 1805. Reproduced by kind permission of the Wellcome Library.

Styrax spp.) and Olibanum (Frankincense) into a fine powder which was then spread over burning coals. Woollen cloths or flannels were then suspended in the smoke which was produced and then rubbed over the parts of the body which were to be treated.[30] Indeed, powdered Amber was combined with a range of other aromatic ingredients, such as Calamus Aromaticus (Sweet Flag), Cyprus Wood, Storax, Labdanum, Pomander, Privet and Ambergris, and kept in closely stoppered glass bottles for putting into aromatic bags for perfuming clothes. It was also worked into Odoriferous Troches for perfuming 'Chambers and Rooms of Entertainment' and yielding scents that 'are very wholesome to the Brain'.[31] A dash of amber was also added to White Hippocras wine in order to enhance its aroma.[32]

In an attempt to explain the supposed therapeutic effects of various materials classed as 'Fetids', including amber, a Dr Pitt (dates unknown) suggested that their fumes 'raise or increase the irregular Motions of the Spirits' in the brain or nervous system, whose movements would otherwise result in 'Hysterical Affections and Convulsions'.[33]

Ointment

William Bullein (died 1576; Fig. 11), cousin of Ann Bolleyn (the second wife of Henry VIII, executed in 1536), used amber in conjunction with a range of precious stones for the treatment of poisoning and a range of other diseases.[34] His recipe for 'Electuarium de Gemmis' consisted of white pearls, little pieces of sapphire, jacinth, cornelian, emerald and garnets, reddened coral, amber, shavings of ivory, and thin pieces of gold and silver. These were mixed with a range of herbs, including saffron, cardamom, ginger and cinnamon. In order to render the mixture into a syrup or electuary, the ingredients were then added to honey. This must have been an extremely expensive medicine to produce; it is little wonder that Bullein treated the

Figure 12. Portrait of John Wecker from the title page of *Secrets of art and nature* (1600). Reproduced by kind permission of the Wellcome Library, London.

nobility. He commends the syrup not only as a wide-ranging cure for physical diseases and states of mind, but also as an acceptable perfume:

> This healeth cold diseases of the brayne, harte, stomake, and the Matrice, it is a medicine proved against the trembling of the harte, fayntyng and sounyng, the weakness of the stomacke, pensifenes, solitarines, kinges and noble men have used this for their comforte, it causeth them to be bolde sprited, the bodie to smell well, and ingender to the face good colour.

Johann Jacob Wecker (1528-1586; Fig. 12), a Basel physician, published a rich source of prescriptions which include amber as an active ingredient. The following recipe, taken from his *Eighteen Books of Secrets,* shows that amber ointment was used for 'the whites'

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(leucorrhoea), so-called because of the whitish genital discharge of viscid mucus in women:[35]

> For the whites an Unguent. Take red Corall, Myrrh, bark of Frankinscence, juyce of Roses, Cyprus Nuts, leaves of wild Pomegranates, Mastick, Frankinscence, Amber, Spicknard, Galla Moschata, Coriander prepared, of each one scruple. Oyl of Roses, Mastick, Spicke Rue, of each half an Ounce, with a little Wax, make an Unguent. Roscellus.

Balsam

Balsams are soothing restoratives, usually based upon aromatic resins. In a recipe for a balsam used in the treatment of wounds, Wecker combines amber with a number of botanical essential and volatile oils as follows:[3:6]

> A Balsam for Wounds of the same Mans. Take pure Turpentine one pound and half, oyl of Bays, Galbanum, gum Arabick, gum Ivy, of each one ounce; Frankinsence, lignum Aloes, Galanga, Cloves, Nutmegs, middle Comfrey, Cinamon, Zedoary, Ginger, white Dittany, of each six drams, Storax liquid two ounces, Musk, Amber, of each one dram: puder what must be pudred and mingle them: add to them Aqua vitae seven pound, put them into a glazed vessel well stopt for eight days, then distil them first with a gentle fire, until the Oyl begins to drop, then increase it until you have distilled it all; then part the Oyl from the water and keep it.

Quilts and pillows

Thomas Fuller (1654-1734; Fig. 13), British physician and preacher famous for his book of proverbs, recommends that amber, together with a selection of fragrant herbal ingredients be quilted into the fabric of a night cap which was then smoked in burnt amber and other resins as follows:[37]

> Take Male Piony root 2 drams; Spanish Angelica root 1 dram; Florentine Orris, Lavender flowers, each half a dram; Arabian Stechas flowers 1 dram; Cloves, Nutmeg, Mace, each 1 scruple; Storax calamite, Labdanum, Amber, Balsam of Tolu, each 1 dram; Oil of Rosemary 5 drops; reduce it to a gross Powder; which being mix'd into Cotton, is to be quilted in a silk Cap according to Art. Every Night at Bed-time, let this Cap be sumed fumed and warm'd with the smoak of Amber, Olibanum, Balsam of Tolu, or the like, Sprinkled upon Coals. Its of signal use in Humid, Pituitose Affections of the Head, in cold, customary, rheumatic Pains of the same. And its believ'd to recreate the Spirits, and roborate the Brain.

Externally, Passera recommended that it be worn as a necklace or collar, or carried in some way in order to impede conditions of the head and throat.[38] As a further treatment for throat problems, particularly inflammation and tumours, it was suggested that amber be heated in a bowl and the vapours inhaled by the patient. The golden colour of amber heralded its usefulness against fevers, and when mixed with apple and medicinal Rose Oil it was used in the treatment of diseases of the ear, much as first recorded by Pliny. Various gynaecological disorders suffered were treated by rubbing Oil of Amber on the pudendum.

Modern availability

A variety of amber medicinal products for use in external treatments is still available from the Baltic region. An internet search will, for example, yield results for amber ointment (an analgesic for rheumatoid arthritis, neuralgia and muscle pain), amber tincture (applied externally for

Figure 13. Portrait of Thomas Fuller. Line engraving by G. Vertue after I. Tymewell. Reproduced by kind permission of the Wellcome Library, London.

headaches and migraine) and amber oil (for scalds, skin allergies, insect bites and stings, rheumatic and muscle pain) from Polish suppliers.[39] From Lithuania it is possible to purchase pillows filled with amber (exploiting its high thermal conductivity and recalling the quilted caps of Fuller 1710), amber incense and amber cosmetic powder.[40]

Acknowledgements

I am very grateful to the staff of the Wellcome Library for the History and Understanding of Medicine and the British Library for access to the many volumes consulted in the preparation of this paper.

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https://doi.org/10.24355/dbbs.084-201802161454

(Here after insueth a little dialogue, betwene twoo men, the one called Sorenes, and the other Chyrurgj: concerning apostumacions, etc.–The booke of compoundes–The booke of the use of sicke men, and medicens). Jhon [sic] Kyngston, London, Jhon [sic] Kyngston, 1562 : Book 2, folio x; Rice, PC. *Amber. The Golden Gem of the Ages*. New York: Van Nostrand Rheinhold Company, 1980: 124; Duffin, CJ. The Gem Electuary. In Duffin, CJ, Moody, RTJ & Gardner-Thorpe, C. (eds.) *A history of Geology and Medicine.* Special Publications vol. 375. London: Geological Society .

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A chemical study of two late 19th century skin medicines

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Soothing skin medicines (i.e. creams/ointments/lotions etc[1]), or at least the wish for them, must be as old as human skin feeling the abrasive effects of wind. The ancient civilisations of Mesopotamia and Egypt, with their hot dust-laden winds, *must* have used them. There would also have been skin diseases, such as eczema and psoriasis, to treat; plus usage for leg/arm ulcers and sores. Additionally, there were the external skin manifestations from epidemic diseases to treat (such as plague, leprosy and syphilis) that have periodically swept through humankind.

Lip salves containing lead have been found in Mesopotamian Ur of c. 2600 BC.[2] Later, from c. 1900 BC of the Babylonian period of Ur, some cuneiform clay tablet fragments have been found that were part of a doctor's personal medical archive. They give (but are not as yet totally translated) recipes for skin problems and practical treatment advice, without any 'magical' content.[3] Also in ancient Mesopotamia there were five words that could be translated as 'leprosy'; one of them *may* have been correct, whilst the others probably referred to various skin problems.[4]

From ancient Egypt only 14 (relatively intact) medical papyri are currently known; they range in date of writing from c. 1850 BC (Kahun papyrus) to the second century AD (Crocodilopolis Medical book). The most well known, with the most recipes listed (877), is the Ebers papyrus of c. 1550 BC.[5,6] This last papyrus gives various recipes for the skin, such as: crushed together in a poultice and applied to skin ulcers were galena (lead sulphide), ox fat, chips of malachite (a green basic copper carbonate) and honey; and, perhaps less invitingly, a cleansing face cream made of bullock's bile and ostrich egg, beaten up with fresh milk.[3,7] Balanos oil, castor oil and goose fat were all used as skin emollients (i.e. to soften and/or moisturise the skin), and were sometimes mixed with other materials (e.g. frankincense, malachite) and used in bandages applied to the skin in order to control infection or promote healing.[6]

Other skin remedies, in various papyri, were for skin beauty care and for controlling or removing wrinkles and other signs of old age. Also, specific skin diseases are difficult to identify owing to problems with obtaining a correct translation of some of the words used. However, what *is* surprising is how few skin recipes are actually given in the papyri. Given their climate and the generally ubiquitous nature of skin ailments in any society one would have thought that there would be a large corpus of such remedies (along with associated spells/rituals/incantations). Perhaps they await discovery or translation, or perhaps they were so well known that few were actually written down?[8]

Hippocrates of Cos (active 5th century BC, Greece) is often seen as the first to introduce rational science (i.e. acute observation and associated deductions) into medicine. Attempts were made to understand the underlying mechanisms of skin disease.[9] Materials used included the yellow sulphide of arsenic (the mineral orpiment) in a paste used on skin ulcers, and pine tar was used to treat a skin disease that *may* have been psoriasis.[10]

Later Roman physicians recommended various salves to treat often well described skin diseases; for example the author Celsus (active 1st century AD) gives for incipient scabies 'agria' (the 'savage one') a salve consisting of zinc oxide, saffron, verdigris (probably a basic copper carbonate), white pepper and a preparation made from unripe grapes.[9] Later, Galen of Pergamon (d. c. 200 AD), who is mostly remembered for his 'humours' theory of medicine, is also credited with inventing possibly the first really effective (i.e. for actually softening and cleansing the skin) 'cold cream'. It consisted of an oil (usually olive oil), beeswax and rosewater.[11] Various herbal remedies were also used for treating the skin in the Roman time period, for example: as a treatment for psoriasis the froth of the (crushed) berries of the buckthorn (*lycium*) plant was applied to the skin.[11]

Mention should also be made of the Roman habit of bathing in, usually communal, bath houses. On the one hand such bathing would have reduced or removed skin parasites (e.g. scabies-inducing lice) and the oil later applied to the skin would have acted as an emollient and so aided 'dry skin' problems and other mild skin

https://doi.org/10.24355/dbbs.084-201802161454

conditions. However, on the *other* hand, as the bath water was often used by many people before being changed then cross-infections would have occurred, especially for someone bathing with an open wound or sore.[3]

When the Dark Ages (c. 500 to 1000 AD) settled over Europe (here taken to be England and the western European countries) then the expansion, and even practice, of medicine declined significantly. There were a few 'lights' in the darkness; the monasteries largely retained their libraries *and* some continued to make copies of new documents brought by travelers; plus, most importantly, the West's medical ideas (especially Galen's) had traveled east to Arabia. There they were modified, added to and recorded along with their own *materia medica* and also with medical information from India, Persia and even China.

Arabian (skin) medicines included such herbal remedies as: *Arctium lappa* (burdock) for eczema, *Galium aparine* (cleavers) for psoriasis and *Aloe vera* (aloe) for fungal infections and vitiligo. Also, mercurial ointments were used to treat scabies (probably first introduced by Rhazes, Muhammed ibn-Zakariya al-Razi, 865 to 925 AD) and were also used to treat 'pox' (probably smallpox), 'itch' (probably scabies, though the word was used to cover almost all irritating skin conditions), impetigo and even leprosy (though this was sometimes confused with vitiligo) by Avicenna (Abu Ali al-Hussain ibn Sina, 980 to 1037 AD).[12, 13, 14]

The path of the revival of medicine and its practice in Europe, from the end of the Dark Ages to the start of the Renaissance (c. 1300 AD), was tortuous, multi-stranded, slow and came largely from the east. First there were travellers from the east with (medical) manuscripts that were copied by the monasteries, and then more knowledge came with the returning Crusaders from the Holy Land in the 11th, 12th and 13th centuries. Also, the papal decree of 1130 AD forbidding nuns and priest who had taken their vows from performing the 'distracting' practice of medicine meant that such practice passed into the hands of lay people. Thus were slowly established 'schools' (of medicine), public hospitals *and* the 'mind-set' to use this returning knowledge.[15] Even the dissolution of the monasteries in England (1536 to 1541), where some manuscripts were destroyed while others were given or sold into private hands and some became the core of later cathedral libraries, was *not* the major disaster it might have been as much information and manuscripts had *already* been dispersed out of the monasteries.

Mercurial ointments for use against scabies had certainly come from Arabia to Europe by the beginning of the Renaissance, the most popular being 'Unguentum Saracenicum' ('Saracen's Ointment').[16] Thus when syphilis (whose external skin symptoms could be similar to those of scabies) first became an epidemic in Europe in about 1495 AD such ointments were almost immediately used on its skin lesions and found to work as a cure for the disease. However, these ointments were *not* always used as first recommended; that is, gently, slowly and carefully. Thus much pain, and some deaths, resulted from mercury poisoning.[17]

Over the next few centuries, from the late Renaissance (i.e. c. 1500 to 1600 AD) to the start of the Victorian period (1837) via the Early Modern and Enlightenment periods, the various skin diseases were treated with both more readily accessible (i.e. English rather than Latin) herbal recipes[18] and various 'heavy-metal' compounds (that is where the metal has a density of greater than 5 g/cm^3; such as lead, mercury and arsenic).[10, 16] There was also a slow general improvement in personal hygiene, and soap was increasingly available (though sometimes only used for washing clothes and household surfaces), which would have tended to reduce the incidence of some skin ailments. Additionally, in the late 18th century of England and Germany skin diseases were given a consistent scientific classification system, which in turn led to specific remedies being suggested for specific diseases. By the end of the first half of the 19th century there was the start of the new specialist medical discipline of dermatology.[9]

The Victorian period and the first part of the 20th century saw both the old remedies (above) being used for skin ailments, and new ones based on organic chemistry (i.e. carbon-based compounds, either extracted from natural occurring materials or synthesised in a laboratory). By the 1880s and 1890s many such new compounds were being used/tried. For example, newly extracted coal tar (as a salve) was being used for psoriasis, the recently patented 'Vaseline' (petrolatum/petroleum jelly) was being used as an emollient, either by itself or mixed with other compounds,[19] and some anti-pruritic lotions contained man-made (dilute) salicylic, carbolic, benzoic or hydrocyanic acids.[9, 10, 20]

So, eventually, came the beginnings of modern antiseptics and antibacterial drugs in the early-to-mid 20th century. Thus both the underlying disease *and* any

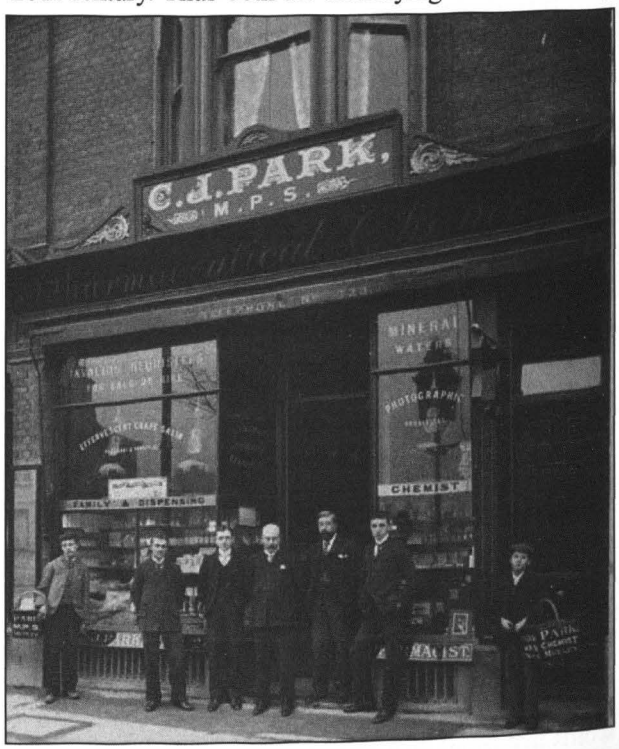

Figure 1. The C J Park Pharmacy shop-front in 1909. (© The Park Pharmacy Trust)

https://doi.org/10.24355/dbbs.084-201802161454

external skin manifestation could (usually) then be readily treated.

Samples and Analytical Methods

The two skin medicine samples (one ointment, one cream) studied by us were originally on display in the 'Merchant's House' and also at Thorn Park Lodge (HQ of the Park Pharmacy Trust), both in Plymouth, UK.[21] They represented part of the final stock of the 'C J Park Pharmacy' shop, which was owned and run (at No. 23 Mutley Plain, Plymouth) by Mr Charles Armstrong Park (son of Mr Charles James Park), when it closed for the last time on the last day of December 1983.

A Mr R A Saunders was the first to open a pharmacy at No. 1 Mutley Plain in 1864. Then this shop, with all its internal fittings, was sold to Mr C J Park and opened for business under his management in 1880. Around 1897 he moved the business to No. 12 (later re-numbered to 23) Mutley Plain (see Figure 1; which shows the shop front in 1909 and where the fifth figure from the left, standing on the shop step, is Mr C J Park). After his death in 1933 the business was initially owned and run by his son (C A Park) and daughter Muriel; both, like their father, were pharmacists. Later the business was solely owned and run by the son, until its closure in December 1983 (see Figure 2; which shows the inside of the shop shortly before the final closure, with Mr C A Park and Dr Jan Knight, the latter looking at the pharmacy's oldest prescription books).[22,23]

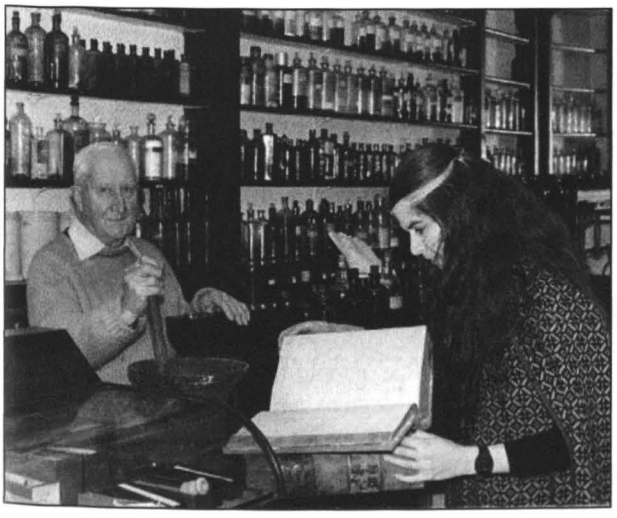

Figure 2. The inside of the C J Park Pharmacy shop in December 1983. (© The Park Pharmacy Trust)

Figure 3. The 'Eczema Ointment' sample (MH1).

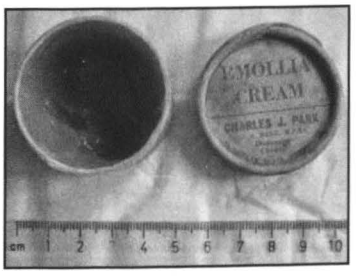

Figure 4. The 'Emollia Cream' sample (MH2).

One of the samples studied is labeled 'Eczema Ointment' (see Figure 3), and was designated by us as sample 'MH1'. The actual ointment is a yellow-brown, fairly viscous solid, as expected for an ointment,[1] and has a slight smell of menthol, or perhaps eucalyptus. Unfortunately no manufacturer's name could be seen on the (only partially legible) label. What can be read is: 'An excellent remedy for all kinds of Eczema' and 'Directions. Apply a small quantity of the ointment two or three times daily.' The container is a screw-top collapsible tube probably made of tin with a pasted-on label. Just readable at the bottom of the label are the words: 'Always start squeezing from this end'. All of this suggests to us a *first* manufacturing date of c. 1895 (i.e. 1890 to 1900).

The other sample studied is labeled 'Emollia Cream' (see Figure 4), and was designated by us as sample 'MH2'. The actual cream is red-orange in colour, has no obvious smell and is not as viscous a solid as sample MH1, as expected for a cream,[1] and was usually sold in small circular cardboard tubs. It was reportedly made to a secret recipe, initially formulated by Mr C J Park and then continued to be made to the same recipe by his son for many years. Exactly when it was *first* made is unclear, but we feel that the most likely date is c. 1885 (i.e. 1880 to 1890); that is within Mr C J Park's first ten years as a practising pharmacist in Plymouth. According to family history it was highly recommended for use for 'dry skin' problems, and possibly also for eczema. Even after Mr C A Park had retired there were frequent requests for it from previous customers.

Both samples were chemically characterised by Low Vacuum Scanning Electron Microscopy (LVSEM) and by X-Ray Powder Diffraction (XRPD). The former technique gives quantitative elemental composition, from both the usual 'area scans' (i.e. over a rectangle of 200 to 400 μm a side) and also by 'spot scans' (i.e. over a circular 'spot' of 2 to 3 μm in diameter). The latter technique gives semi-quantitative identification of the crystalline compounds present.[24]

Also, some 'wet chemistry' experiments were done on one sample (MH2), and their details are given below.

Results

The LVSEM analytical results are given in decreasing order of weight percent of the elements present (with those in brackets being at less than 1% each) from a representative 'area scan', with any additional 'spot scan' results being mentioned separately later. The XRPD results for the compounds found are listed in decreasing order of their (approx.) percentage presences and where these values are given after each compound/group of compounds.

Sample MH1 (see Figure 3)

LVSEM: C, Pb, Hg (Cu, Cl, O, N, Si).

XRPD: *Major compounds*: White lead [basic lead carbonate, $2PbCO_3.Pb(OH)_2$] and one (or more) amorphous compound(s) (80 to 90% overall);

Minor compounds: Cerussite (lead carbonate, $PbCO_3$) and/or Plattnerite (lead dioxide, PbO_2); Ammoniated Mercury (mercuric ammonium chloride, $HgNH_2Cl$) (5 to 10% each);

https://doi.org/10.24355/dbbs.084-201802161454

Small amount: (i.e. just above the detection/resolution limit of our instrument, taken to be 2%) compound Calomel (mercurous chloride, HgCl) (2 to 3%).

Sample MH2 (see Figure 4)

LVSEM: C, Pb, Hg (Cu, O, Cl, Si).

XRPD: *Major compounds*: Amorphous compounds and calomel (80 to 90% overall);

Minor compounds: Sassolite (boric acid, H_3BO_3) (10 to 15%);

(Probable) small amount compound: Litharge (red-orange form of lead monoxide, PbO) (2 to 3%), where the uncertainty arises from there being several weak/overlapping peaks present that make its identification difficult/uncertain.

There was also a small broad peak at about 2 degrees two-theta in its XRPD data, and a possible interpretation of it will be mentioned in the Discussion and Conclusions section.

Later detailed LVSEM work, using 'spot scans', was done on both samples. Looking at mercury-rich regions showed, for both samples, Hg:Cl values of approx. 1:1. The lead-rich regions of both showed the presence of Pb, C and O, though some of the carbon was very probably from the base material. When the base material was itself studied *only* carbon was found for both samples.

Additionally, several 'wet chemistry' experiments were done on small amounts of sample MH2. To test for the possible presence of the (red) organic colourants alkanet (root) and cochineal some dilute sodium hydroxide and dilute hydrochloric acid were added separately to small amounts of the sample. Both of these colourants change colour with changing pH (to blue for alkanet root, for pH > 7; and to yellow for cochineal, for pH < 4). No such colour changes were observed. Also, to another small amount of the sample excess dilute hydrochloric acid was added and after light shaking/mixing the mixture was gently heated. If a carbonate was present then (carbon dioxide) gas would have been observed when the acid was first added but *none* was observed. On gentle heating some gas *may* have been released.

Discussion and Conclusions

As *only* carbon was found, using the LVSEM technique on the base material regions of our two samples, then this shows that these base materials are petroleum products. Paraffin wax is one such product; it can be yellow in colour, is usually largely amorphous and is usually regarded as being a mixture of hydrocarbons. However, depending on its age and origin, it *can* contain a small amount of oxygen-containing molecules --- which can be difficult to 'see' using the above technique.[25] When used as an ointment base it was sometimes mixed with a little petroleum jelly (Vaseline) to reduce its viscosity and so improve its (skin) spreadability. Our MH1 sample is described as an ointment, and given its relatively high viscosity then its base is taken to be (largely) paraffin wax. As petroleum jelly is much less viscous than the wax then it is suitable for use in creams, such as for our MH2 sample. The jelly was sometimes mixed, to further reduce the cream's viscosity, with a little liquid paraffin. As already mentioned Vaseline was used both by itself (as a skin emollient) and for a variety of other skin problems when mixed with various 'active ingredients'.[19] The jelly/Vaseline is also largely amorphous.

Thus the yellow-brown colour of sample MH1 *could* be solely caused by the paraffin wax used in its manufacture. However, there could also be a small amount of lead dioxide (PbO_2), which is chocolate-brown in colour, present in the sample (see the previous Results section). Whilst lead carbonate would be expected to be present (as an impurity in white lead), the presence of several weak/overlapping XRPD peaks means that the lead dioxide *could* also be present.

The proposed identity of the (amorphous) lead compound present in sample MH2 rests on several 'indications', both chemical and historical. Our LVSEM 'spot scan' results on the lead-rich regions in the sample shows that they contain lead, oxygen and carbon. From other recipes of skin remedies of the time period (i.e. late 19th and early 20th centuries) this result then suggests the presence of one of the following compounds: lead acetate/sub-acetate (i.e. the basic form of the acetate), basic lead carbonate/lead carbonate and a lead plaster (here taken to be impure lead oleate, see below).[26,27,28] As *no* gas (carbon dioxide) was evolved when room-temperature dilute hydrochloric acid was added to the sample then the presence of a carbonate can be ruled out. Also, as the sample exhibited none of the expected physical properties (e.g. efflorescence, crystallinity) of an acetate/sub-acetate then it can probably also be ruled out. This leaves the lead plaster (sometimes: emplastrum plumbi, lead plaster-mass, lead soap, Diachylon plaster-mass, Diachylon). It was first made by heating a mixture of olive oil, water and litharge.[1, 29] Later this recipe was modified by dilution with more olive oil or with the newly discovered Vaseline. Other (often lead) compounds, in small amounts, would sometimes be added.[30, 31] However, the main chemical ingredient of the final plaster would nearly always be (impure) lead oleate. This compound, even if only partially or slightly crystalline, should have an observable XRPD peak at about two degrees two-theta,[32] which in fact is seen. Also, the sample's red-orange colour could easily be achieved by adding a slight excess of litharge during the making of the lead plaster (and as the 'wet chemistry' tests for the two most likely red organic colourants gave negative results). Additionally, a (lead) soap would act as a suitable emulsifying agent in the making and stability of a cream.[1]

Lead plasters have been used for centuries to treat bruises, sores and ulcers.[33] They were also so used, and to treat skin diseases such as eczema, in later time periods and even on into the 20th century.[27, 31] However, lead poisoning most likely did sometimes occur, especially if the plaster covered the skin for some time. Even now, lead poisoning does occur from the long-term use of a 'Diachylon ointment'.[34]

White lead has been used as a face cosmetic, to give 'pale allure', for centuries. It has also been used for skin remedies because of its known astringent action.

https://doi.org/10.24355/dbbs.084-201802161454

Unfortunately lead poisoning can occur from excessive usage.[28, 31, 35]

The two mercury-containing compounds, ammoniated mercury and calomel, found in our samples also have a history of being used to treat various skin diseases (e.g. eczema and psoriasis).[10, 27, 36] They do have antiseptic properties, but are not now used because of the danger of mercury poisoning, which unfortunately does still sometimes occur.[36, 37, 38]

Boric acid *was* used in skin medicines as an antiseptic, antifungal and as a preservative until it was recognised (in about the mid.-20th century) as being toxic if used in excess.[26, 39]

Thus the two skin medicines studied here, one ointment and one cream, have *both* been found to contain lead and mercury compounds. For the 'Eczema Ointment' (MH1) sample they are primarily white lead and ammoniated mercury, with smaller amounts of lead carbonate and/or lead dioxide and calomel. For the 'Emollia cream' (MH2) sample they are primarily (very probably) a lead plaster (i.e. impure, and largely amorphous, lead oleate) and calomel, with a smaller amount of boric acid; its red-orange colour is most likely given by a just detectable small amount of litharge. Whilst there is still some uncertainty about the identity of the amorphous lead compound present in this sample, we feel that the various 'indications" mentioned previously do strongly point to it being a lead soap/plaster. The base materials used in both samples are petroleum products; for MH1 it is mostly or entirely paraffin wax (possibly mixed with a small amount of petroleum jelly), and for MH2 it is mostly or entirely paraffin jelly (Vaseline; possibly mixed with a small amount of liquid paraffin).

Both samples were very probably *first* made in the late 19th century, and were then made to the same recipes for the pharmacy's customers for many subsequent decades. However, in the present day such medicines, regardless of whether they actually were efficacious, would not be approved for use owing to their lead and mercury content. So, whilst abrasive winds and the proverbial 'itch' need no longer threaten as they once did, these two medicines can no longer be used as *they* now threaten.

Acknowledgements

We would like to thank the following people for their help with this project: Dr Jan Knight (Chairperson of the Park Pharmacy Trust; email for the Trust is enquiries@parkpharmacytrust.org.uk) for access to the samples, background/historical information and for permission to use two of the Trust's images (Figures 1 and 2); Mrs Jane Stockall (grand-daughter of Mr CJ Park) also for background/historical information; Mr Alan Humphries (of the Thackray Museum, Leeds, UK) for several very useful (electronic) discussions on old skin medicines and their containers (especially with respect to their dates of first manufacture); Ms Sharon Uren (of the Camborne School of Mines, Cornwall, UK) for the 'wet chemistry' experiments on sample MH2; and to the staff of the Chemical and Materials Analysis Unit (University of Newcastle, UK) for the experimental LVSEM work mentioned in this article.

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Endnotes and References

1. Ointments were initially made using greasy base materials (i.e. with little or no water present) such as lard, wool fat, goose grease and later using petroleum (hydrocarbon) products (e.g. paraffin wax or the jelly/Petrolatum, 'Vaseline'). The 'active ingredients' were dissolved or suspended in a small amount of the base and the remainder of the base then added slowly whilst stirring to achieve good overall consistency. The amount of base material in the final medicine varied greatly (i.e. 5 to 95%), but often it was present at about 50 to 70% by weight. Creams were made in a similar fashion to ointments, but contained water; the greasy/fatty material and water were heated together with an emulsifying agent and so the final products were less greasy. In general, ointments are more viscous solids than creams and are insoluble in water. Ointments are applied to a specific area of the skin and can be expected to stay there for some time as they do not readily wash off, while creams are more easily applied to a larger area of skin and being more dispersible in water can more easily be washed off. A lotion is a medicated liquid that can very easily be applied over a large area of skin. Salve, balm and unguent are older words for an ointment. Also, the word 'plaster' (sometimes 'plaister') was used in the past to refer to a 'plaster mass' spread onto leather, cotton or linen, which was then wrapped around the affected portion of the skin to achieve prolonged contact. This plaster mass consisted of the active ingredients mixed with a resin, wool fat or beeswax. The resulting semi-solid preparation then had to be *gently* heated to become spreadable. When the 'plaster mass' was made from a lead compound (often litharge, PbO) and olive oil and water then the resulting impure lead oleate was often referred to as a 'Diachylon'. Further details of its modifications and uses are mentioned in the Discussion and Conclusions section (p. 56), along with associated references.
We are indebted, for most of the above information, to: Information Sheet 6: 'Ointments, Creams and Plasters' by PG Homan (2002) of the Museum of the Royal Pharmaceutical Society, London (contact email: museum@rpsgb.org).

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https://doi.org/10.24355/dbbs.084-201802161454

A History of the Barbiturates: The Lure, the Controversy, the Poison

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How did a drug once so lauded for its safety become a component of the modern-day lethal injection? The history of the barbiturates is brimming with controversy, debate and intrigue, and this article follows the early turbulent course of the barbiturates, from their rise as the saintly 'harmless hypnotic in 1904 through to the court cases and high profile suicides, controversial animal trials, and a blazing debate over the pages of two British medical journals on the safety of this so-called 'bottled death'. The history of the barbiturates between the 1920s and 1960s is detailed in existing articles, and thus we know how the barbiturates came to be used in epilepsy and anaesthesia. This article aims to address the deficit in the history of the earlier years of the barbiturates, from their introduction in 1903 through to the labelling of barbiturates as prescription-only in 1935.

Physicians in the early 20th century did not meet with consensus regarding their views on the safety of the barbiturates. This disagreement resulted from, in part, differences in the specialisation and thus experiences of those who took part in the debate. It could be said that the high prevalence of barbiturate use was due to a collective view that these drugs provided easily accessible and harmless relief from the dreaded condition of insomnia. It was the opinion of others, however, that such indiscriminate use would lessen the willpower and moral integrity of the person, entering them into a destructive and inescapable habit.

Introduction

The therapeutic uses of the barbiturates in the present day are mainly restricted to the treatment of certain types of epilepsy, emergency treatment of convulsions, and as intravenous inducers of anaesthesia. Pentobarbitone is used for human and veterinary euthanasia, and is a component of the lethal injection. The dangers of barbiturate use are apparent to many medical professionals, owing to a large number of reports on their dangers and abuse as recreational drugs since the 1950s.

The history of the barbiturates between the 1920s and 1960s is detailed in existing articles, and thus we know how the barbiturates came to be used in epilepsy and anaesthesia.[1-3] These sources are published in clinical journals, and document the clinical features and chemical structures of the various barbiturate drugs. There has, to the author's knowledge, been no previous detailed history of the earlier years of the barbiturates, a period which encompasses the introduction of Veronal [barbitone] as a sleeping aid in 1903, the labelling of barbiturates as poison and prescription-only, and the debates over the safety of this class of drugs.

In this article I aim to address this deficit by answering whether physicians in the early 20th century met with consensus regarding their views on the safety of the barbiturates, and determining why physicians argued for and against the regulation of barbiturates as a poison. I aim to answer why people used barbiturates with such frequency in the early 20th century and what effect the indiscriminate use of barbiturates had on society. I also aim to assess whether the fact that all barbiturates were classified as poisons in 1935 had any effect on their prevalence of use. It is important to examine the answers to these questions because they may be translated onto the issues, which include safety and addiction, surrounding controversial drugs of the modern age.

Veronal as Hypnotic

Barbituric acid, from which the barbiturates are derived, was first synthesised in Germany in 1864 by Adolf von Baeyer[4]. Barbituric acid, however, had no pharmacological action of its own. Veronal (also known as barbitone, barbital, or diethyl-malonylurea) was introduced into the UK by German manufacturer Bayer in 1903. It was the first barbiturate to be used therapeutically. Veronal appears in *Squire's Pocket Companion*, a manual of the *British Pharmacopeia*, in 1904, and is described as a hypnotic that can be used in neurasthenic insomnia as well as sleeplessness following mild pain.[5] The dose suggested is 5 to 20 grains.[6] Veronal appears again in the *British Pharmaceutical Codex 1907*.[7] It is described as a hypnotic said to act only upon the central nervous system, found especially suitable for use in insomnia associated with cardiac disease. The dose recommended is 5 to 15 grains.[8] Neither text, however, gives any mention of Veronal poisoning.

The *British Pharmaceutical Codex 1911* also documents the use of Veronal in nervous insomnia.[9] The 1911 edition, however, highlights that poisonous symptoms have been noticed even with doses of 10 grains. The Codex also gives details on administering strychnine, a stimulant, in the event of Veronal poisoning.

However, this possibility of poisoning was not recognised by the manufacturers when they introduced the drug in 1903. Veronal was marketed as a safe and reliable alternative to the current sleep-inducing drugs of the time, which included the bromides, a class of soporifics with a series of problems relating to high toxicity, long half-life and the capacity to accumulate in tissue.[1] A German advert for Veronal from 1904[9a]) promoted Veronal as a new hypnotic drug that can be used reliably and without unpleasant side effects to treat insomnia, depression and anxiety. The safety of Veronal was also promoted in the medical press in Britain, which during this period was aflame with glowing reviews of the new hypnotic. The *British Medical Journal* (BMJ) wrote in 1903 that no unpleasant side-effects with Veronal had been noted and that it should be introduced into clinical practice.[10]

Thomas Watt, a physician, praised the safety of Veronal in a letter to the BMJ in 1904:[11]

> I have taken it frequently myself, and from my experience with myself and the patients I have come to regard it as the safest and surest, and in every way most satisfactory, hypnotic I have ever met.

https://doi.org/10.24355/dbbs.084-201802161454

Later in 1904, however, an anonymous letter to the BMJ entitled 'Veronal: A Warning' aimed to caution those doctors who employed the hypnotic.[12] The author warned that Veronal, although a good hypnotic, took time to act and seemed to have a cumulative action[13].

A year later in 1905, Kress, a German physician, introduced the concept of veronalism to the BMJ.[14] Kress wrote that the cumulative action of Veronal had been met with by many clinicians, and that Veronal can have many unpleasant or dangerous actions:

> Among the symptoms which it has produced are sickness and delirium, rash, giddiness, headaches, sweating, collapse, motor restlessness, orthotonos and titanic twitching, cumulative action and prolonged sleeplessness, comatose condition.

Kress recommended others to be careful in prescribing Veronal, and to be content with the smallest possible doses.

In the BMJ (1909), a court case of suicide by Veronal overdose is discussed. A medical witness to the case stated that the tablets were prepared in seductive form and were on sale without restriction by chemists, and the public seemed to think that they could take any number of them with safety.[15]

These reports of death from Veronal overdose extended from the medical press into the public sphere. In November 1909, the *Daily Express* newspaper carried an article entitled 'Veronal Dangers' which, in response to the death of a barrister due to an overdose of Veronal, quoted a doctor who said:

> [Veronal] is obviously a more dangerous drug than was at one time supposed. I think it should only be sold on a doctor's prescription.

The article also quoted a chemist, who said: "The sale of Veronal is largely on the increase. I am sorry to say there are no restrictions on the sale". The coroner of the case observed: "These cases are becoming very familiar. People should be prevented from obtaining this drug except under very great restrictions."[16]

These concerns were echoed three years later in a *Daily Express* article (January 1912), again on a death involving Veronal. The article quoted the coroner of the case, who noted that "[Veronal] is becoming a very serious danger to the public." The coroner added that "it has been shown conclusively that it is not a drug which people ought to obtain so easily" and "a great responsibility rests on those chemists who do a roaring trade in it."[17]

The *Daily Express* wrote in 1913, under the headline 'The Warning of Veronal Tragedies':[18]

> There are many people nowadays driven almost to distraction by nervousness [...] and in particular by sleeplessness, who turn in desperation to some dangerous drug such as Veronal, to pull them through a more than usually trying period. The second dose is taken easily – then the third and fourth, and before the victim realises the fact he or she is a slave to the drug.

By the end of 1913, Veronal had taken hold as the new fashionable drug to take. It could be seen that the taking of Veronal resulted in moral corruption of an individual and was thus an indication of the moral breakdown of society. Insomnia was feared, and Veronal was the cure. 'Veronal is the new thing and the old poison', said the *Daily Express*.[19] A pill that could so easily be taken to send a person to sleep and forget his troubles was 'like nectar straight from high Heaven, a blessed antidote, a sweet release'. However, as the *Daily Express* warned, 'first a little, then more, is the inexorable rule,' until 'the wreck of what was once a man's free will be destroyed, brain power atrophied, knows no law but that of the craving which must be satisfied at any cost.'

Since the Pharmacy and Poisons Act 1868, the [Royal] Pharmaceutical Society of Great Britain had the power to deem a substance a poison, subject to approval by the Privy Council[20]. Henceforth, in order for a pharmacist to qualify and be able to dispense a scheduled poison, such as arsenic, they had to pass exams set by the Pharmaceutical Society to become either a Chemist and Druggist or a Pharmaceutical Chemist.

An unsuccessful attempt to add Veronal to the Poisons Schedule was made in 1912, whereby a resolution was given to the Privy Council by the Council of the Pharmaceutical Society to add di-ethyl barbituric acid to Part II of the Poisons Schedule. However, this did not mete with approval by the Lords of the Privy Council.[21]

The reasons for this initial disapproval by the Lords of the Council are not obvious. However, Sir William Glyn-Jones, secretary of the Pharmaceutical Society, wrote in 1926 that every occasion of pharmaceutical legislation since 1851 has been a matter of compromise between conflicting interests.[22] On the one hand, some believed that to ensure public welfare, those men who dispensed and supplied poisonous substances should be properly trained and certified. On the other hand, other persons believed that this would simply create an undesirable monopoly for the trained pharmacists, and mechanical precautions such as poison cupboards should instead be taken. Further difficulties in such matters can lie in balancing the responsibility of the state with the liberty of the individual.

Veronal as Poison

A mysterious case of poisoning by Veronal overdose created a large amount of public interest in 1913. The mystery surrounded the death of Hugh Eric Trevanion, aged 27, a relative of the Earl of Strathmore and Lord Northland.

Six weeks prior to the death of Mr Trevanion by Veronal overdose, he had moved in with a friend named Mr Albert Roe. Mr Trevanion had been taking Veronal to treat insomnia for the past six years.[23] A post-mortem examination showed that on this occasion Mr Trevanion had taken at least 150 grains [9.8g]. The inquest was held to question whether Mr Trevanion had committed suicide or whether he was murdered by his friend Mr Albert Roe, to whom Mr Trevanion had previously left his entire fortune in his will.

The Hove case created much public interest, achieving a lot of publicity in both the national press and the medical press, a point noted by an article in the *Chemist*

https://doi.org/10.24355/dbbs.084-201802161454

and Druggist.[24] *The Times* and the *Daily Express* both carried numerous articles giving information on the inquest, and the case even gained international interest with the *New York Times* carrying an article on February 2nd 1913 about the case, entitled 'Poison Killed Earl's Relative.'[25]

In response to the suicide of Mr Trevanion and other cases of suicide/accidental death by Veronal overdose, the jury added a rider to the effect that Veronal and allied substances should be placed on the Poisons Schedule, and should only be available on prescription by a medical professional.[26]

An editorial article in the BMJ wrote that the death of Mr. Trevanion was important in highlighting some important features of Veronal poisoning, namely ataxia, hallucinations and tremor.[27] This article holds significance as an indication of broadening definitions of harm, as it identified side effects apart from death that occurred with Veronal poisoning. The same article stated that it was a matter of urgent importance to protect the public against themselves by restricting the freedom with which Veronal, which was introduced by German chemists as a 'harmless hypnotic', could be bought from a pharmacist. This article therefore held the view that the increasing prevalence of barbiturate use was due to the public, through ignorance of medical matters, purchasing and self-dosing barbiturates rather than over-prescription by the medical profession.

The claims made in this editorial were not without a defensive response from the pharmaceutical industry. Bayer argued that they had never claimed Veronal to be a 'harmless hypnotic', but maintained that they had said Veronal was 'relatively harmless in therapeutic doses'. They did, however, concede that it was very potent and had 'untoward effects' when used indiscriminately.[28]

The high profile Trevanion inquest and the jury's rider added impetus to a second proposal in 1913 to add Veronal to the Poisons Schedule, and the Lords of the Council were thus compelled to pass this second resolution.[21] From April 12th 1913, all derivatives of barbituric acid were placed on Part II of the Poisons Schedule, and deemed poisons within the meaning of the Pharmacy Act 1868, as amended by the Poisons and Pharmacy Act 1908. This meant that Veronal tablets were now subject to the following restrictions:

- They can only be dispensed or sold by retail by a qualified pharmacist and
- When sold by retail they must be labelled with the name of the article, the word 'poison', and the name and address of the seller

However, these new regulations still placed no restrictions on members of the public buying Veronal without prescription. For some in the medical profession, such as Sir William Willcox, these new regulations on barbiturates were still not enough.

Veronal as a Prescription-Only Drug?

Sir William Willcox (1870–1941), a toxicologist and medical adviser to the Home Office, had supported the attempted resolution in 1912 through personal correspondence to the Privy Council.[29] He also appeared as a Home Office expert in the Trevanion inquest in 1913. After the inquest, Willcox wrote a paper in the *Lancet* on Veronal poisoning, stating that the average minimum fatal dose of Veronal could be regarded as 50 grains [3.25g] of Veronal although cases of death had been reported with doses as small as 10 grains [650mg]. Willcox quoted the figures of the Registrar-General for deaths from Veronal poisoning occurring in England and Wales as being 13 in 1909, and 15 in 1910, but stated that the actual number of cases might be higher than the statistics showed.[30]

A report of a meeting of the Section of Therapeutics and Pharmacology of the Royal Society of Medicine appeared in the BMJ in 1927.[31] Willcox spoke about the effects of acute barbiturate poisoning, which were headache, vertigo and ataxia, followed by a deep sleep after which the patient might die from a sudden development of massive pneumonia. Willcox also expanded on the category of chronic effects of barbiturate use, stating that, from his experience, patients who took Veronal every night were liable to show moral changes, become delusional and depressed, and develop suicidal tendencies. Dr F A Pickworth, a physician and researcher into mental disease at Hollymoor laboratory in Birmingham, gave animal experimental evidence to prove Willcox's theory that the continued use of barbiturate drugs would cause definite pathological changes within the central nervous system.

At the meeting, Willcox warned that the barbiturates should only be given by prescription, marked 'not to be repeated' and the total number of doses ordered should not exceed six. Willcox also warned that the 'widely circulated advertisements' for barbiturates 'frequently recommended the drugs for continued administration without calling attention to the toxic effects which might result from their use.'. An advert for Veramon (which contained barbitone) and Medinal (barbitone sodium) by Schering Co, circa 1925, stated that Medinal is a 'safe and non-habit forming hypnotic'. Willcox also asserted that addiction to barbiturates did occur due to careless administration.

Sir Maurice Craig (1866-1935), a consultant psychiatrist, stated his disagreement with Sir William Willcox in a letter to the BMJ in 1927, a move that would begin a series of increasingly heated exchanges, later to become known as the 'Battle of the Barbiturates'.[32] In Craig's experience, sleeplessness was not a symptom but one of the most common causes of mental disturbance. Craig's practice, for the past twelve years, had been to administer the smallest possible dose of Medinal every night for up to a year, until the mental health of the patient had been restored. Craig wrote:[32]

> I have never known any bad results from the effect of the drugs. On the contrary, I have known many persons saved from serious mental breakdown and preserved in mind and body to continue their several occupations [...] As to addiction, from my own experience and from any evidence that I have been able to obtain from other medical men, this is practically non-existent.

https://doi.org/10.24355/dbbs.084-201802161454

Craig vehemently opposed any attempt to label the barbiturate drugs as dangerous because, in his clinical experience, this would have been entirely without justification. Craig continued to argue that to label a drug as dangerous would discourage a doctor from using these drugs that Craig so adamantly believed were of great use. Furthermore, if a nervous patient were warned that the drug they were due to take was dangerous, this would worsen the anxiety of the patient and thus counteract the ability of the drug to relieve their insomnia.

Sir William Willcox replied to Craig in a letter to the BMJ, writing that according to the Registrar-General for England and Wales there had been 253 deaths from poisoning by barbiturates between 1906 and 1925 inclusive[33]. Willcox went further to say these figures may be far lower than actual, due to some Veronal deaths being labelled as deaths due to narcotic poisoning or pneumonia. Willcox used evidence from other clinicians' experiences to stress that there was often clear evidence of addiction to the drug, arguing that Craig had simply not yet witnessed addiction to Veronal in his patients because addiction was only discovered when the drug was withheld.

Other physicians argued alongside Craig to maintain that barbiturates should not be classed as dangerous. Lionel Weatherly, a psychiatrist, had never witnessed a case of 'drug habit' with barbiturate drug use, and implored other alienists to come forward to 'help all those who believe sleep and relief from mental pain are necessities'.[34] William Stuart-Low, a surgeon, argued that Medinal had been indispensable for patients with sleeplessness from nasal obstruction, and had never seen any marked addiction to Medinal when used over long periods[35]. Robert Gillespie, an eminent psychiatrist, claimed that Dr Pickworth's animal trials, used as evidence by Willcox, were flawed, as[36]

- Cats were unsuitable subjects, as the barbiturates do not induce sleep in cats
- The doses given to the cats were disproportionately large to those given to man
- The animals were not allowed to recover before they were killed and observed for histological change.

Craig felt the emphasis Willcox had laid upon the danger of the barbiturates was jeopardising their great therapeutic value, and argued that the cases of suicide that had been quoted by Willcox could not be proven to have been due to depression induced by prolonged Veronal use. Craig asserted that it was the sleeplessness (for which the patients were taking Veronal) that had caused depression that led to suicide, rather than the effect of taking Veronal itself. Like Gillespie, Craig seriously questioned the nature of evidence obtained from animal trials and whether such evidence could be extrapolated into clinical practice, while continuing to deny the existence of any cases of Veronal addiction.[37]

The debate between Craig and Willcox over the safety of the barbiturates then disappeared from the BMJ, but ignited once again in the *Lancet* in 1934. Craig still maintained the non-existence of barbiturate addiction, with the exception of a few individuals who were generally susceptible to addiction. He argued that subjecting these drugs to further restrictions would only make the patient fearful of treatment and distract them from following the advice of their physician.[38]

William Stoddart, a psychiatrist, stated that the confusion had resulted from a failure to identify the precise meaning of 'addiction', leading to a misunderstanding between an 'addict' and someone who was simply in the 'habit' of taking a hypnotic every night.[39] Willcox still maintained his position on arguing for further restrictions to be placed on barbiturates, and was supported by Sir James Purves-Stewart, a neurologist, who described syndromes of mesencephalic, cerebellar, and spinal paralyses resulting from repeated therapeutic doses of barbiturates.[40,41]

In the same 1934 issue of the *Lancet*, Gillespie set out to determine the possible dangers of the barbiturate drugs and to definitively state whether there was any possible relationship between therapeutic dose and lethal effect.[42] Gillespie concluded from surveying all records of barbiturate-related death in medical literature that, up to the end of 1932, there was no case on record in which barbiturates given in therapeutic doses had caused death in the absence of complicating factors. Gillespie also quoted the Registrar-General's statistics for 1931, to show that there were only 13 cases of suicide by barbiturates in that year, 0.26% of all suicides, and 20 suicides from barbiturates in 1932. Indeed, the 1931 Registrar-General statistics showed that barbituric acid came eighth out of a list of 12 types of poisonous agent used for suicide. Willcox, however, stated that these Registrar-General figures for fatal poisoning expressed only a fraction of cases of dangerous poisoning from the barbituric acid derivatives, since a large number of patients were saved by medical treatment.[43]

The debate between Willcox and Craig was a conflict between two leading figures in different fields. As an expert toxicologist, Willcox defined harm in terms of pathological changes to the body. During his time acting as a medical witness in criminal cases, Willcox would have observed many deaths caused by barbiturate overdose, and would have been exposed to the coroners' repeated exasperations over the ease at which barbiturates could be purchased. Craig on the other hand, as an expert physician, defined harm in terms of what he saw in his clinical experience. If Craig saw no harm from barbiturates in his clinic in terms of symptoms, then he would assert that the barbiturates were safe to use. Perhaps Craig's reluctance to accept Willcox's beliefs laid in Craig's unwillingness to be supplanted from authority in a field in which Willcox was not a part .

Outside of the pages of the medical press, some authors of medical textbooks held views consistent with those of Craig. Hugh Crichton-Miller, a psychiatrist, wrote that Veronal craving was merely driven by an intense desire for sleep and a fear of insomnia.[44]

New Barbiturates, New Indications

In the meantime, new barbiturates with new indications had been developed. Phenobarbitone, for which the trade

https://doi.org/10.24355/dbbs.084-201802161454

name was Luminal, was discovered in 1912.[45] Alfred Hauptmann had, by chance, found phenobarbitone capable of preventing epileptic seizures, and regarded phenobarbitone as free from harmful side-effects even when used continuously over several months. In 1921, Golla concluded in a landmark paper that phenobarbitone treatment was superior to the existing bromide treatment and that there were no cases of formation of drug habit with the drug.[46] Chronic phenobarbitone therapy was from then on seen as the most appropriate treatment for epilepsy, and so was a fertile testing ground for Willcox's ongoing theory that mental derangement occurred with chronic barbiturate use.

In 1934, Richard Handley, the director of the David Lewis Epileptic Colony in Cheshire, wrote on the use of the barbiturates in epilepsy.[47] Handley acknowledged the dangers of acute barbiturate poisoning and, as a precautionary measure, would not prescribe more than eight days' medicine at a time, since even if the whole eight days dose were taken at once, this would be merely a soporific dose. However, Handley openly denied the beliefs of Sir William Willcox that chronic barbiturate use would cause definite degenerative changes within the central nervous system and lead to mental disorders such as depression. Despite the large amounts of phenobarbitone prescribed, he had seen no single cases of addiction. Handley wrote that he could quote many cases of colonists who, after ten or more years of regular phenobarbitone dosage, showed no such degenerative changes, concluding:

> One must believe that if any degenerative change occurs in such a case it is not produced by the phenobarbitone, but by the disease itself or by some other treatment.

Handley therefore acknowledged the dangers of acute barbiturate poisoning, but discounted any claims that addiction or chronic poisoning could occur in barbiturate treatment for epilepsy.

The manufacture of barbiturate drugs, in time, became no longer limited to German pharmaceutical companies. When America entered the war in 1917, Congress passed the Trading with the Enemy Act which allowed American companies such as Abbott Laboratories to produce the German barbiturates.[48] By 1922, the volume of business had never been greater for the company, with their biggest selling item being Veronal.

Nembutal (pentobarbitone) was later developed as a basal anaesthetic by Abbott Laboratories in 1930.[48] Cecil Rowntree, a London surgeon, wrote in 1932 that the introduction of the intravenous injection of Pernocton or Nembutal was the greatest advance in the practice of anaesthetics during his professional life.[49]

Sir William Willcox spoke at a meeting of the Medical Society of London in 1931 to discuss the use of barbiturates in anaesthesia from a toxicological point of view.[50] Willcox said that while Nembutal was indeed a quickly acting barbituric acid compound with an effect that was more transient that others of this group, great caution must still be taken in its use and dosage.

The thiobarbiturates, introduced in 1935 by Abbott Laboratories, rapidly displaced the older barbiturates such as Nembutal for use in anaesthesia, due to their very short onset of action.[1-3] During the time period when it was employed in anaesthesia, Nembutal was not deemed dangerous if used in skilled hands. Indeed, Willcox himself believed that basal anaesthetics, when used as an adjuvant to general anaesthesia, were a useful addition to modern therapeutics.[51] Goodman and Gilman wrote that accidental poisoning may occur when the barbiturates were used for intravenous anaesthesia by a person not sufficiently experienced.[52]

However, while these landmark discoveries of barbiturate applicability in epilepsy and anaesthesia were occurring, the danger of barbiturate use in insomnia was becoming more evident year by year. Articles that reported on cases of suicide and commented on the dangers of Veronal continued to appear in newspapers. In 1935, the *Daily Express* described barbiturates as 'the easy bottled death that anyone can buy'.[53] Another headline in the Daily Express read 'Death sold over the counter – Another Victim', with the article stating:[54]

> The toll of human life claimed by barbiturate drugs mounts higher [...] Although the customer is supposed to be known to the chemist, *Daily Express* representatives have proved by personal purchases that some chemists are willing to 'know' anyone.

An opinion column in the *Daily Express*, with reference to the sale of Veronal, read 'If you peddled loaded revolvers like that to unhappy people, temporarily despairing, there would be trouble.'[55]

The *Chemist and Druggist*, in the interests of pharmacists, attacked such newspaper articles, writing that such exaggerations by ignorant stunt journalists would lead to the passing of more unnecessary acts like the Dangerous Drugs Act.[56]

Against a background of medical press dissent and national press indignation towards the barbiturates, the Poisons Board became inclined to resolve the situation. As such, in May 1935, barbituric acid and its derivatives were included in the Fourth Schedule of the Pharmacy and Poisons Act 1933. The barbiturate drugs were therefore to be supplied to the public only on presentation of a prescription written by a medical practitioner.[57]

Further Discussion

Sir William Willcox's campaign had finally culminated in the barbiturates becoming prescription-only drugs in 1935, twenty-three years after he first announced their dangers in the BMJ. However, these new restrictions on barbiturates did not have quite the effect that Willcox and other proponents had hoped. Barbiturate use and abuse still continued in the UK, and by 1952 barbiturate overdose with suicidal intent had become so common that a classification system was put in place in the emergency services.[58] Demand for barbiturates had risen, and the manufacture of barbiturates in Great Britain expanded rapidly. By 1950, the output of barbiturate drugs was four times that of 1938.[59]

Many physicians, not fully understanding the dangers of the barbiturates, would freely prescribe them to patients.[60] Patients could also order barbiturates without prescription from Ireland, where there were no

https://doi.org/10.24355/dbbs.084-201802161454

regulations governing barbiturate purchase.[61] In the month of September 1949, 9.4% of prescriptions under the National Health Service were for barbiturates, and prescribing physicians could be easily misled by the large number of adverts promoting the safety of barbiturate drugs.[60] While many new barbiturate drugs had been developed over the years, the advantages of the new barbiturates over the older ones were unconvincing.[62]

Pharmacology textbooks still denied the dangerous and addictive potential of the barbiturates, with Goodman and Gilman writing in 1941 that 'addiction to the barbiturates, in the strictest sense of the word, probably does not occur'.[63]

The barbiturates eventually fell from use in insomnia in the 1960s after the introduction of the benzodiazepines. By this time, the evidence for barbiturate addiction and causation of mental degeneration had mounted beyond dispute. In 1961, Harry Beckman, author of *Pharmacology: The Nature, Action and Use of Drugs*, wrote that 'the taking of barbiturates for hypnotic or sedative purposes is a much abused thing which can easily lead to serious addiction' – a stark contrast to the writings of Craig and others who had earlier denied the existence of addiction.[64] Barbiturates were slow to be realised as drugs of addiction due to years of confusion between the definitions of addiction, habituation, tolerance and dependence.[65] As Willcox had warned Craig, withdrawal symptoms were rarely identified in patients because the barbiturates were prescribed for long periods in individual patients, and if symptoms of withdrawal did occur they were mistaken for the recurrence of the condition the barbiturates were used to treat.

This article can thus complement the existing literature on the history of the barbiturates to show that controversy was inextricably intertwined with the landmark developments of barbiturate use in epilepsy and anaesthesia. A point for further discussion could be to determine the extent to which the pharmaceutical companies, the medical professionals, pharmacists, the government, and the public themselves were responsible for the indiscriminate use of barbiturates before 1935, and to what extent the poison regulations in 1935 altered the responsibility of these parties.

Conclusion

In conclusion, physicians in the early 20th century had differing views on the safety and potential for addiction of the barbiturates. The controversy surrounding barbiturates resulted, in part, from a difference in personal experience and profession. A toxicologist such as Sir William Willcox, exposed to the harsh realities of barbiturate-induced suicide in the courtroom, had contrasting views to a psychiatrist such as Sir Maurice Craig, to whom barbiturate addiction was not visible as he, in his clinical experience, had not yet witnessed withdrawal in his patients. Craig also placed too much conviction in the therapeutic value of the barbiturates to let them be subjected to regulations that would, in his opinion, negate their remedial effect.

From the opinions held in newspaper sources, it can be seen that barbiturate use was high, as they were relished as a quick and easy remedy to sleeplessness caused by the stresses of life, but barbiturates did not treat the underlying mental cause. As the newspapers realised, however, such indiscriminate use would lessen the willpower and moral integrity of the person, entering them into a destructive and inescapable habit. The fact that all barbiturates were classed as poisons and became prescription-only had little effect on their prevalence of use post-1935. Before 1935, Willcox had campaigned to protect the public from themselves, but after 1935 the responsibility of such indiscriminate barbiturate use could surely only rest in the hands of the medical profession who prescribed them.

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https://doi.org/10.24355/dbbs.084-201802161454

In the same article, Kress described the death of one of his own patients to whom he had prescribed Veronal to treat the disturbed sleep of a female patient with extreme hysteria. Kress' patient had been secretly taking increasing doses of Veronal – and it was to this Veronal abuse that Kress attributed to the death of the patient.
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Continued on p. 66

https://doi.org/10.24355/dbbs.084-201802161454

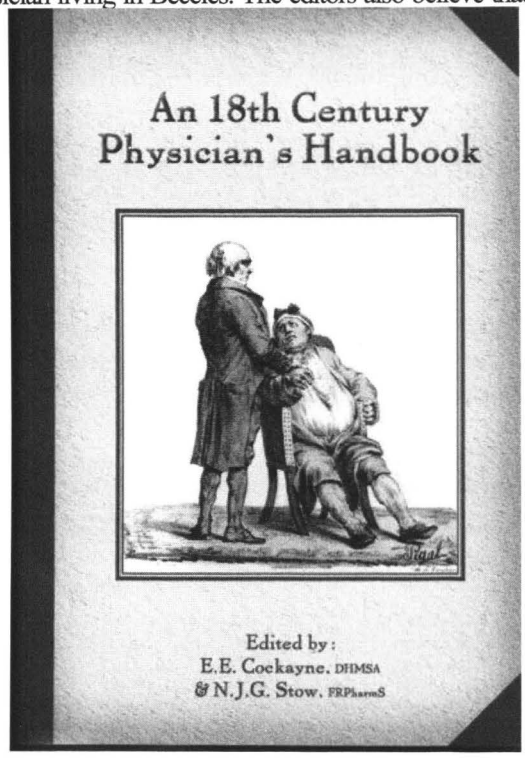
Book Review

An 18th Century Physician's Handbook.

Edited by Cockayne, EE and Stow, NJG.

Published by the Editors and the Suffolk Medical History Society, 2012. Pp161. ISBN 978-0-9573248-0-0. Price £17.50

Dr Edward Cockayne (retired General Practitioner) and Mr Noel Stowe (retired pharmacist) have transcribed an 18th century doctor's notebook. The author is unknown but the editors believe him to be William Bohun (1681-1743), a physician living in Beccles. The editors also believe that the notebook was written as a preparation for a textbook as one of the pages bears what would appear to be a provisional title for the book: '*The Rationale of the Symptoms or Appearances in the Morbic State of a Humane Body considered mechanically under the general Divisions of Quantity, Quality and Motion, with the Particular Remedies adjusted to their Respective Indications and referred to the preceding Practice in order to illustrate their necessary Variations in different cases*'.



The book is a paperback, 21cm x 14.5 cm x 1.7cm. The pages of the original notebook have been photocopied in colour, and the majority are printed on the left-hand page. For each case study the author records the patient's symptoms, the treatments and the treatment administered. Among the medicines prescribed are live millipedes (woodlice) for coughs and a suggestion to 'piss' on the bite of a rabid dog to fight hydrophobia (rabies). Many of the treatments rely on bloodletting, vomiting and purging. On the opposite page is a transcription of the handwriting and added notes to explain, in modern terms, the ailments and the treatments. Coloured and black and white illustrations add to the interest of the text pages.

There are two appendices: 'Biographies of people mentioned in the text' and 'Medical and alchemical signs'. These are followed by a Bibliography, Glossary, Index of people and places, and an Index of general, medical and pharmaceutical subjects.

The book is a fascinating insight into the way that medicine was practised and I would recommend this book to anyone interested in the treatments of the past and those wishing to improve their skills in reading old medical documents.

Copies aavailable, price £17.50, from Dr EE Cockayne, Green Farm House, Woolpit, Bury St Edmunds, Suffolk IP30 9RQ. Send a cheque for £20 (to inc. p&p in UK) payable to 'Suffolk Medical History Society' with your name and address.

Continued from p. 65

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ISSN: 0079-1393 Indexed in Medline as Pharm. Hist. (Lond.)

Typeset and Produced by Ralph Allen Press Ltd, Bath BA1 3EN

https://doi.org/10.24355/dbbs.084-201802161454

PHARMACEUTICAL HISTORIAN

Vol. 43 No. 4
December 2013

British Society for the History of Pharmacy
Q House, Troon Way Business Centre, Humberstone Lane,
Thurmaston, LEICESTER LE4 9HA

Founded 1967

https://doi.org/10.24355/dbbs.084-201802161454

British Society for the History of Pharmacy

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Tel: 0116 274 7355, Fax: 0116 274 7365, Email: bshp@associactionhq.org.uk
Website: www.bshp.org

The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.

An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.

Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*

Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

Membership

Membership costs £20.00 per annum and includes:

Four issues of the *Pharmaceutical Historian.*

Regular meetings, with guest speakers, usually in November, February and May.

Visits to places of historic interest, museums, collections, botanical gardens, etc.

Annual Conference, usually in March/April.

Free use of the Royal Pharmaceutical Society of Great Britain's library facilities for research.

Help in historical research and with the identification of artefacts.

Affiliation to the International Society for the History of Pharmacy (ISHP).

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Application forms are available from the Honorary Secretary at the address above or on *www.bshp.org*

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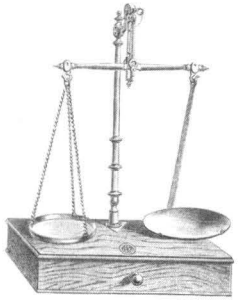
https://doi.org/10.24355/dbbs.084-201802161454



PHARMACEUTICAL HISTORIAN

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Contents

Diary

Evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated.

Monday 10 February 2014

'Pioneers of Inhalation: a history of inhalers' by Mark Saunders. Lambeth, 5.30 pm.

Monday 12 May 2014

'The Apothecary in Medieval and Early Modern Society' by Dr Pat Cullum. Lambeth, 5.30 pm.

Future dates

Monday 6 October 2014

To be confirmed.

BSHP Annual Spring Conference 2014, at Best Western Westley Hotel, Birmingham

The annual conference 2014 will be held from Friday March 28th to Sunday March 30th at the Best Western Westley Hotel, Westley Road, Acocks Green, Birmingham, West Midlands, B27 7UJ. The price is being held at last year's level of £300 all in.

The hotel is situated on the outskirts of Birmingham, yet only minutes from the city centre, the NEC station and the airport.

A booking form with details will be mailed in December. If you would like to bring a poster please indicate this on your application form. Posters can be any size and either landscape or portrait format. Contact: Dr S Ellis, 1 Willow Way, Bottisham, Cambridge. CB25 9BS or e-mail shirleyellis@shirlellis.plus.com

Theft from RPS Museum

In a letter to the *Pharmaceutical Journal* on 15th November, the Royal Pharmaceutical Society President, Martin Astbury, reported that a theft had occurred from the Society's Museum. The items taken include irreplaceable cups, medals and items dating back to the Georgian period. Mr Astbury wrote:

"We know members will feel as angry and saddened as we do about this theft. We are doing everything possible to recover these items and are working very closely with specialist Museum Art and Antiques Police teams and auction houses to try and retrieve these valuable and, more importantly, historic legacy items."

He went on to explain that the Society had been advised that they are unable to disclose any further details about the crime because of the ongoing Police and criminal investigation. He also confirmed that the Society was implementing security recommendations from the Police, and that the Society's insurers are involved.

Mr Astbury plans to set up a special meeting with BSHP representatives and any other interested parties to discuss any practical steps that can be taken following the incident. Any interested in attending should contact Gold Egele at gold.Egele@rpharms.com or 0207 572 2697.

The President also encouraged members with any additional information that will assist in police inquiries to contact the Met Police Art & Antiques Unit on 0207 230 2150 quoting crime number number 1233581/13. He provided his own email address should anyone have further questions: president@rpharms.com

National Museums Wales

In 2007, Amgueddfa Cymru (National Museums Wales) were given a collection of 469 materia medica specimens by Professor TD Turner OBE of the Welsh School of Pharmacy, Cardiff University. Professor Turner has worked with Dr Victoria Purewal, the Botanical Conservator, to fully catalogue the collection, and a searchable spreadsheet with records for all of the specimens is now available online. The spreadsheet includes scientific and common names, geographical origin, and pharmacological uses. The physical specimens are available to researchers by appointment. Full details, an introductory article and a link to the spreadsheet are available at http://www.museumwales.ac.uk/en/rhagor/article/medica/ Professor Turner is a founder member of BSHP.

https://doi.org/10.24355/dbbs.084-201802161454

Medical equipment taken on expeditions during the heroic age of Antarctic exploration: Sledging Cases

Dr HR Guly FRCP, FCEM

Retired consultant in emergency medicine, Derriford Hospital, Plymouth

This paper describes the medical cases taken on sledging journeys of the expeditions of the heroic age of Antarctic exploration and their contents.

On the early Antarctic expeditions, nowhere was the balance between having adequate medical supplies and their weight more important than when sledging. Whether a sledge is pulled by dogs or man, there is a limit to what can be pulled and every kilogram of medical equipment means a kilogram less food or fuel. The southern journeys of the *Nimrod* and *Terra Nova* expeditions both lasted over four months over rough terrain so some supplies were needed but it would be hoped that the requirements for medicine would be small, as not only should explorers be medically screened before going to Antarctica but it is also clear that they were reassessed before the sledging teams were chosen. Presumably the drugs and equipment chosen were considered the bare minimum to treat any emergencies that might occur in such a population.

Sledging medical cases

The *Discovery* expedition was lent two of the no. 137 medical cases[1] (see fig 1) for sledging but this is just a drug case and they would have needed additional storage for dressings, drugs for injection and ophthalmic use, and other equipment.

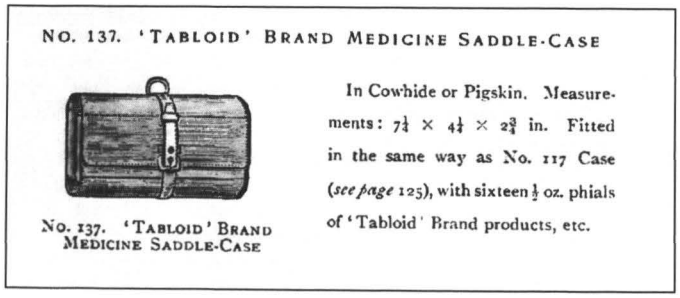

Figure 1. Burroughs Wellcome No. 137 medicine case. From: Anon. *The Evolution of Antiseptic Surgery.* London: Burroughs Wellcome & Co, 1910: 127.

The drug case that Shackleton took on his journey towards the South Pole on the *Nimrod* expedition[2] (fig 2) also looks like a BW 'Tabloid' medical case 137 and this expedition, too would have needed additional storage.

Dr Atkinson says that the *Terra Nova* took '12 No. 117 special cases designed by Dr. Wilson'.[3] In fact the 117 medical case (fig 3) was a small case containing 16 different medicines and commercially available and just formed part of the contents of the sledging medical case.

The canvas sledging case (figs 2 and 4) was designed by Dr Edward Wilson, presumably based on his experience of the *Discovery* expedition. He asked for a case made of stiff

Figure 2. Canvas medical case taken on *Terra Nova* expedition and medicine case taken by Shackleton on his Furthest South sledging expedition.
Reproduced by kind permission of Science Museum.

Figure 3. Burroughs Wellcome No 117 medicine case. From: Anon. *The Evolution of Antiseptic Surgery.* London: Burroughs Wellcome & Co, 1910: 125.

canvas with a strap to go all round it and which could act as a handle. It should be no more than a six inch (15 cm) cube and should be lightweight but should be extendable so that it could hold more, if required. He illustrated what he wanted with a drawing4 and the case was made by BW&Co. This would have contained the 117 medicine case. The No. 117 case is very similar to the 137 case with both cases containing 16 half-ounce (15-g) phials of drugs.[5]

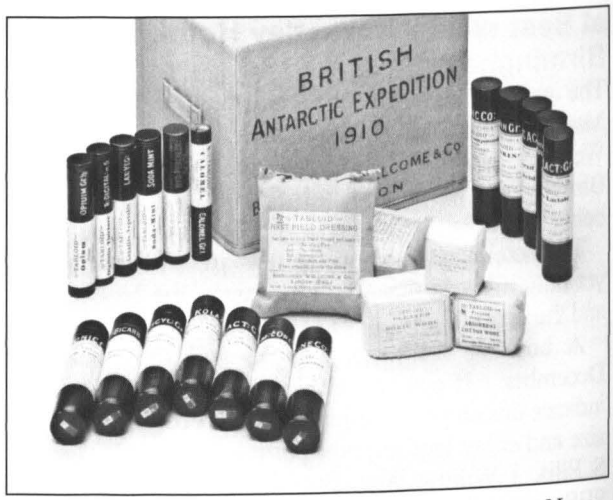

Figure 4. Canvas medicine case taken on *Terra Nova* expedition and contents.

https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Drugs in sledging cases

	Terra Nova		*Nimrod*		ITAE
	As described by:		As described by:		
	Atkinson	Canterbury Museum	Shackleton	Canterbury Museum	
Aromatic chalk & opium	*	*	*	*	*
Aspirin/Xaxa	*	*			*
Caffeine compound	*				*
Calcium lactate	2	2			
Kola compound	*	*	See text		*
Sodium salicylate	*		*		
Tonic compound	2	*			*
Bismuth & soda	*	*	*	*	*
Digitalis tincture	*				*
Opium	*	*			*
Soda mint	*	*	*		
Calomel	*	*			*
Corrosive sublimate (mercuric chloride)	*	*	*		*
Laxative vegetable		*	Laxative pills'		*
Gelsemium Tincture		*			
Boracic acid powder	*	*	*	*	
Sodium bicarbonate powder	*	*		*	
Borofax	*				*
Hazeline	*				*
Iron & arsenic compound			*	*	
Quinine bisulphate			*	*	
Hemesin (adrenaline)			*		*
Cocaine hydrochloride			2		
Zinc sulphate			2		
Aloin Compound			*		
Chlorodyne			*		*
Sulphonal			*		
Bismuth pepsin, charcoal			*		
Potassium chlorate			*		
Ammonium bromide			*		
Ginger essence			*	*	
Morphine sulphate			*		
Easton's syrup			*		
Blue pill & rhubarb compound				*	
Antipyrine cpd (Phenazone)				*	

(continued)

https://doi.org/10.24355/dbbs.084-201802161454

Table 1. Drugs in sledging cases *(continued)*

	Terra Nova		Nimrod		ITAE
	As described by:		As described by:		
	Atkinson	Canterbury Museum	Shackleton	Canterbury Museum	
Coffee mint compound				*	
Tannin compound				*	
Quinine hydrochloride				*	
Salol (phenyl salicylate)				*	
Lead with opium				*	
Paregoric (camphorated tincture of opium)				*	
Ipecacuanha Compound				*	
Gingamint					*
Trional					*
Pyramidon (aminopyrine)					*
Argyrol					*

Ernest Shackleton's sledging medical equipment for the ITAE was 2 canvas sledging cases, each of which contained a No. 3 hypodermic case and a number 90 ophthalmic case.[6] BW&Co would have used their experience gained from supplying one expedition for the benefit of later expeditions and I imagine that the canvas case was probably the same as, or very similar to, that designed by Wilson. I also suspect that the Australian Antarctic expedition took the same cases, as Dr Archibald McLean's diary describes them as 'Willesden canvas sledge cases of Burroughs Wellcome'[7] and these are the same words as Wellcome used to describe Wilson's case.

BW&Co proudly stated that "both Amundsen and Scott carried 'Tabloid' Outfits. So, whichever one of them had won, the 'Tabloid' Equipment would have been first at the South Pole as at the North Pole"[8] (Peary had taken a BW&Co case to the North Pole). In a photograph[9] the case carried by Roald Amundsen appears to be a no. 137 medicine case.

Drugs carried in sledging medical cases

It is difficult to be certain what drugs were carried in the sledging cases but medical cases 117 and 137 both have room for 16 phials of tablets and in Wilson's sledging case, there was room for other drugs. On the *Terra Nova* expedition the drugs carried are given by Atkinson[3] and this corresponds to the drugs supplied by BW&Co.[10] However a reference in the Canterbury Museum (Christchurch, New Zealand)[11] gives a slightly different list of drugs that were carried on the journey to find the bodies of Scott and the others and on the ascent of Mount Erebus. I am not sure where this list came from but, if it is correct, presumably the drugs were changed for the second sledging season based on their experience during the first season.

These lists may not be complete as on the return from the South Pole, Wilson records in his diary: 'Dressing Evans' fingers every other day with boric Vaseline.'[12] Although this was taken on the *Terra Nova* expedition, there is no other mention of it in the sledging medical equipment.

Shackleton, in the book "The Heart of the Atlantic" describes the medical equipment that he took on the Southern journey on the *Nimrod* expedition[13] and I have previously compared this with the equipment taken into the field by British Antarctic Survey field parties.[14] There are two things to be added to the information in that paper. Firstly Shackleton said that he had taken 'ophthalmic tabloids'. I have no information on what he took but it is likely to be the same as that taken on the *Terra Nova* or the ITAE as described below. The second thing to add is that, in addition to the expedition medical kit, Dr Eric Marshall also took some 'Forced March' tablets, a BW&Co product containing cocaine and kola. This seems to have been on the initiative of Marshall himself rather than part of the formal expedition supplies. This is described below.

This list, too, is very different from a list in the Canterbury museum.[11] These lists are compared in Table 1 which gives the two versions of the *Terra Nova* sledging drugs, the two versions of the *Nimrod* sledging drugs and the drugs taken in the ITAE sledging cases.

The ophthalmic drugs on the *Terra Nova* consisted of 12 tubes of ophthalmic 'Tabloid' product DD.[3] This was zinc sulphate gr 1/250 and cocaine hydrochloride gr 1/20, 20 tabloids per tube,[15] which were for snow blindness. On the ITAE, the sledge case contained a No. 90 ophthalmic case.[6] I have described the ophthalmic cases and drugs elsewhere.[16] The non-drug contents of the sledging medical cases on the *Terra Nova* expedition are shown in Table 2.

The non-drug contents of the ITAE[6] and Australian sledging cases drugs are identical. The Australian drugs consisted of 'an assortment of tabloid drugs for general treatment'[17] and so are almost certainly very similar to those taken by Scott and Shackleton.

While Scott, Shackleton and Amundsen planned sledging expeditions to the South Pole that lasted several months, the French expeditions were ship-based,

https://doi.org/10.24355/dbbs.084-201802161454

Table 2. The non-drug contents of the sledging medical cases on the *Terra Nova* expedition.[3]

Field dressings
Court plaster
Adhesive plaster
Pins, safety pins
Artery forceps, sutures, tweezers, scissors
Lancet
Medicine dropper
Ophthalmic dropper
Camel hair brushes
Eye shades left and right (these presumably were useful for snow blindness)

scientific expeditions with much shorter sledge journeys. The contents of the medical kit for sledge journeys on the second expedition are shown in Table 3.

Roald Amundsen said:

> We took a little travelling case of medicines from Burroughs Wellcome and Co. Our surgical instruments were not many: a dental forceps and - a beard-clipper.[19]

These dental forceps were used, as Oscar Wisting developed toothache on the return from the Pole.[20] (Shackleton did not have dental equipment in his sledging kit on the *Nimrod* expedition and Dr Eric Marshall broke Jameson Adams' tooth when he extracted it without appropriate instruments.)[21]

Amundsen's Eastern Party of three people, who had a 6-week sledging expedition, travelled even lighter, saying:[22]

> Our medical outfit was exceedingly simple. It consisted of nothing but a box of laxative pills, three small rolls of gauze bandage, and a small pair of scissors, which also did duty for beard-cutting. Both pills and gauze were untouched when we returned ...

Alcohol

Alcohol was also taken for its medicinal value. Thus Wilson wrote: 'No alcohol was taken on sledge journeys, except for a small can of brandy for emergencies.'[23] Whisky was also used and the second French expedition is reported to have taken 3.5 kg of rum for 3 people on a 10 day sledging expedition,[18] which seems excessive.

Cocaine and other stimulants

On the internet there are many references to Shackleton and Scott using cocaine eg 'Intrepid polar adventurer Ernest Shackleton explored Antarctica propelled by tablets of Forced March'[24] and "in 1909, Ernest Shackleton took 'Forced March' brand cocaine tablets to Antarctica, as did Captain Scott a year later ..."[25] The truth is less exciting.

On the return from the attempt to reach the South Pole, the four expedition members ran out of food before reaching a depot. Dr Marshall later described events:

> Between 25th and 27th [December] we turned night into day with forced marches and brief rests, all food being exhausted, but twice we had sugarless and milkless tea or cocoa. Not until this moment did I produce 24 'Forced March' tablets (cocaine), and only then when I thought that we would make the depot before the effects of the last dose had ceased to be effective.[26]

Table 3. The contents of the medical kit on the second French *(Pourquoi Pas?)* Expedition.[18]

Drugs
Cocaine
Laudanum
Morphine for injection
Quinine
Caffeine
Rhubarb
Topical preparations and dressings
Lead subacetate
Vaseline
Dressings for frostbite
Diachylon (a medicated dressing)
Dressings and pins
2 packets of gauze
3 bandages
Surgical equipment
Needles, forceps, suture
Scalpel
Artery forceps

He described the same events in a letter to the *British Medical Journal*[27] and gave more information in correspondence saying:

> The 'Forced March' (Cocaine preparation) was issued from 5.30 pm on the 26th, at hourly intervals, [the recommended dosage schedule] until the early morning of the 27th, the supply being exhausted ... While it lasted, the effect was dramatic and we had every hope of making the depot that night. The final collapse of two members was due to the reaction and failure to obtain the food which I was reckoning on, but was not available until about 15 hours later.[28]

Stimulating the body to make it do more work in the absence of nutrients is clearly risky and because of the failure to reach the depot while still under the influence of the 'Forced March', Marshall said that he was "still guessing whether the 'Forced March' nearly killed us or saved us!"[29] After some of the party collapsed, Marshall went on alone to the depot to obtain the food they required and had some lumps of sugar. He went on to say:

> the effect of the 2 lumps of sugar, some 15 hours later, was equally dramatic, and if I was asked to choose between the relative merits of these two stimulants, under similar conditions, I should choose sugar.[28]

This incident does not seem to justify the description of Shackleton exploring Antarctica 'propelled by tablets of Forced March.

'Forced March' (also known as 'kola compound') was a combination of extracts of coca (active ingredient cocaine) and kola (active ingredient caffeine). 'Forced March' was a BW&Co trade name, but other companies also manufactured kola compound. The same drug was taken on Scott's and Shackleton's second expeditions and was certainly used by members of the Ross Sea Party section of Shackleton's expedition.[30] It was also used by troops during the First World War.

Easton syrup tabloids (Iron phosphate, quinine, strychnine) were also used as stimulants on this expedition, both by

https://doi.org/10.24355/dbbs.084-201802161454

Shackleton on his attempt to reach the South Pole[31] and by the party that reached the South Magnetic Pole.[32]

Alcohol might be used in a similar way. Thus Dr McLean relates how a party of three men on the Australian expedition missed a depot and had to travel 67 miles with minimal food.

> Fortunately, they had, as well, a small store of absolute alcohol, which was ordinarily used for lighting the primus stove. Without doubt, the stimulation of small quantities of the alcohol, taken from time to time, helped them in safety to the Hut.[33]

There is very little information as to what drugs were actually used on the march. Snow blindness was common and the treatment of this has been described elsewhere.[16] Diarrhoea was also common, especially on the *Nimrod* expedition but we are not told how Marshall treated it though Edward Evans was treated with both brandy and aromatic chalk and opium when he collapsed with diarrhoea associated with scurvy on the *Terra Nova* expedition.[34]

We are also not told what analgesia was given for Adam's dental problem as mentioned above. Apsley Cherry Garrard had his heartburn. 'made … better with the medical case'[35] 251, perhaps with sodium bicarbonate or soda mint (sodium bicarbonate, ammonium bicarbonate and peppermint oil) but we are not told which.

Acknowledgments

This research was made possible by a Short Term Research Award in the History of Medicine for Clinicians and Scientists from the Wellcome Trust, for a study on 'Medicine during the Heroic Age of Antarctic exploration'.

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https://doi.org/10.24355/dbbs.084-201802161454

Edward Joseph Shellard – A Phenomenal Pharmacognosist: Part 1

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Edward Joseph Shellard was born on August 8th, 1913 at Minchinhampton in Gloucestershire and was educated at the Marling School, Stroud. He studied Pharmacy at the School of Pharmacy, London, and graduated in 1936. His academic career started at the Merchant Venturers Technical College, later College of Technology, Bristol, in 1946 and he then joined the staff of the Department of Pharmacy, Chelsea College, London in 1957, retiring in 1978. He was known to many as Joe or even 'Jalap Joe' because of his early research into Convolvulaceous resins. Joe was a passionate advocate for his favourite subject, Pharmacognosy, and during his career received degrees and honours for his contribution to teaching and research. He obtained his PhD from the University of London in 1960 and was awarded Fellowships of the Royal Pharmaceutical Society, the Royal Institute of Chemistry and the Linnaean Society of London. The Warsaw Medical Academy awarded him an honorary DSc and he was an honorary member of the Pharmaceutical Societies of Bulgaria, Hungary and Poland. He was President of the Medicinal Plants section of the International Federation of Pharmacy (FIP) from 1980–1984.

These awards testify to his academic achievements but give little indication to his path through academia or about him as an individual. This article is based on an unpublished manuscript prepared by him, entitled 'My 32 years in academia, 1946-1978' that is archived at KCL London. As authors of this article, and his former PhD students, we are able to attest to his strong leadership in academic Pharmacy and Pharmacognosy. He continued to give us support and encouragement throughout our careers.[1,2] Looking back through his career it is possible to chart the changes that occurred in Pharmacy and Pharmacognosy between 1946 and 1978. In particular he grasped the evolving analytical techniques that enabled him to provide a scientific background to the constituents of medicinal plants and to his special interest in Pharmacognosy. He changed the Pharmacognosy syllabus for undergraduate Pharmacy students, and Pharmacognosy research, emphasising the chemical constituents of medicinal plant drugs and not just their botanical characteristics. In doing so, his model was copied in many different countries and it is due to his enthusiastic efforts that Pharmacognosy continued as a distinct subject in many UK Schools of Pharmacy.

The School of Pharmacy, Merchant Venturers Technical College, later the College of Technology, Bristol, 1946-1957

Shortly after the end of World War 2 Joe was working for the pharmaceutical company Genatosan but he was not happy with the emphasis on organic chemistry and chemical engineering. In June 1946 he applied for a lectureship in Pharmacognosy at the Bristol School of Pharmacy because this was his favourite subject as an undergraduate. He replaced DJ Williams, who had founded the School in Bath in 1907, and became responsible for the teaching of Pharmacognosy and Forensic Pharmacy. At the time of his appointment William Cooper was Head of Pharmacy and George Moore, a pharmacist, was Head of Science. Space was in very short supply and Joe had no office.

In 1949 the finance and management of the Merchant Venturers College was taken over by the Bristol City Council and it became the Bristol College of Technology. The 1948–9 session brought changes for the School of Pharmacy because the Pharmaceutical Society had introduced new regulations to phase out the 9 months course leading to the Chemist and Druggist (C&D) diploma and replace it with the Pharmaceutical Chemist (PhC) 2 year diploma. There was insufficient money available to take on additional staff needed for the new course and insufficient space to accommodate students in the longer course. The School of Pharmacy at Cardiff did introduce the PhC course but were unable to take the 20 students already enrolled for the C&D course. Despite the problems that existed at Bristol, William Cooper asked Joe to draw up a modified timetable that would allow them to take in the 20 extra C&D students from Cardiff. The students were far from happy with the new timetable and this added further to the problems at Bristol. In addition, the Pharmaceutical Society was not satisfied with the accommodation at Bristol and the level of staffing. The local Education Authority was not prepared to fund two additional members of staff for Pharmacy and could not make more space available for the College. It looked as though the 1950–1 session would be the last one for the Bristol School of Pharmacy.

September 1950 marked the 21st anniversary of the move of the School of Pharmacy from Bath to Bristol and William Cooper, with Joe, considered what form of celebration could be arranged. William Cooper was concerned that the level of pharmaceutical education at Bristol, an important city, was not comparable with such cities as Manchester and Nottingham where Pharmacy was taught in the universities. They planned a grandiose dinner in cooperation with the Local Branch of the Pharmaceutical Society for March 1951 with guests including the Lord Mayor, the Vice Chancellor of Bristol University and the President of the Pharmaceutical Society. Although the dinner was a great social success it was a failure in not helping to raise the level of Pharmacy teaching at Bristol. The President of the Pharmaceutical Society did not help because in his speech at the dinner he emphasised the need

https://doi.org/10.24355/dbbs.084-201802161454

for more manpower for retail Pharmacy and played down the role of universities in pharmaceutical education.

A further inspection by the Pharmaceutical Society followed shortly afterwards and this resulted in the appointment of two further members of staff to teach Pharmaceutics in the 1951–2 session. Joe anticipated that his teaching load would be reduced, but this was not to be because he also had to teach Galenical Pharmacy. In 1953 William Cooper was elected as a member of the Council of the Pharmaceutical Society and this meant attending meetings in London as well as giving lectures throughout the country to Local Branches of the Pharmaceutical Society. Inevitably this added further to Joe's teaching schedule.

During this session Joe was appointed as an external examiner in Pharmacognosy for the Pharmaceutical Society and this added to his status as a teacher of Pharmacognosy.

Despite his heavy teaching load he commenced a research project examining samples of Brazilian Jalap obtained by DJ Williams prior to World War I. He wrote a research paper on his findings and submitted the manuscript for publication in the *Pharmaceutical Journal*. The paper was sent to Dr TE Wallis, School of Pharmacy, University of London, who was asked to act as a referee. Wallis invited Joe to visit him to discuss the research and thus began a long friendship between them. The paper was redrafted, submitted to the *Journal of Pharmacy and Pharmacology* and accepted for publication.[3] This research paper was not only the first one from the Bristol School of Pharmacy but it was also the first one from the Bristol College of Technology. There was a practical application to this research because Vera Cruz Jalap and Ipomea were commercially available and officially recognised for medicinal use. Macroscopic and microscopic characters were investigated and chemical analysis by paper chromatography identified the sugars present. Other papers followed[4,5] and not only did this research lead to the nickname 'Jalap Joe', but it also brought him into contact with postdoctoral students at the Department of Chemistry, University of Bristol, who later became professors of Chemistry in UK universities.

Joe was a very sociable person and he enjoyed the company of other members of college staff in the lecturer's common room and he became their chairman. He was also active in the college branch of the Association of Teachers in Technical Institutes (ATTI). William Cooper retired as Head of the Bristol School of Pharmacy in 1955. Joe applied for the headship but he was not surprised that he was not successful because, as an active member of the ATTI, he had often been in conflict with several members of the selection committee. Mr DA Norton became head and the Principal promised Joe a Senior Lectureship. This did not materialise and Joe became very unsettled at Bristol.

His final activities at Bristol were in connection with the British Pharmaceutical Conference held in 1957. William Cooper was chairman and Joe was in charge of printing and publicity. He and his wife Sylvia acted as hosts at Wills Hall of Residence where many of the delegates stayed. During the conference there was a debate on pharmaceutical education and Mr CW Maplethorpe, chairman of the Pharmaceutical Society's Education Committee proposed that the 2 year PhC course be replaced by a 3 year degree course. Joe took part in the debate and supported Mr Maplethorpe's proposal. A few years later the 3-year degree course was introduced as the entrance to the profession of Pharmacy.

The Bath and Bristol Old Pharmacy Students Association was formed in 1952 and Joe became their secretary and treasurer. Although he resigned from the College in 1957 after 11 years on the staff, he was invited back the following year to give the DJ Williams memorial lecture to the Association, the School of Pharmacy and the District Branch of the Pharmaceutical Society. His lecture was entitled 'Pharmacognosy at the Crossroads'. He never forgot his links with Bristol and when he became chairman of the Board of Examiners in Pharmacognosy for the Pharmaceutical Society he enjoyed his visits back to the Bristol School. His post at Bristol was taken over by David Shaw, a fine musician, and they became good friends. When David left he was replaced by Dr Roland Hardman from Nottingham University and it was Joe who persuaded Roland to attend meetings of the Medicinal Plants Section of FIP. Roland later became a distinguished President of this group.

The Bristol School of Pharmacy eventually became the School of Pharmacy, University of Bath, and again Joe met with his former colleagues when he was External Examiner for the B Pharm degree. When Dr DA Norton retired as the Head of the Bath School of Pharmacy Joe was invited to make the presentation to him. He also met George Moore again, a pharmacist and former head of the Department of Science at Bristol College of Technology. George Moore was one of the founder members of the University of Bath and he became the Vice Chancellor.

Department of Pharmacy, Chelsea College, London, 1957–1978

Joe joined the Department of Pharmacy, Chelsea College, as a Lecturer in 1957. He was shocked to find that Pharmacognosy was situated in a small and dilapidated out-building. When it rained heavily the building was flooded, as water came in via the roof. Mr DC Harrod (Dougie), Senior Lecturer in Pharmacognosy, became Joe's immediate boss. This small building was divided into two by a partition forming two undergraduate laboratories and Mr Harrod had a desk within one of them. Practical classes were held for 1st and 2nd year BPharm students, 3rd year students specialising in Pharmacognosy and 1st and 2nd year PhC students. There was no separate space for Joe and he had to make do with a small desk in a corner of the smaller laboratory. He shared the teaching of practical classes with Georgina Jolliffe who was an Assistant Lecturer. Classes were held each day Monday to Friday, except Wednesday, with evening classes for those who

https://doi.org/10.24355/dbbs.084-201802161454

had failed previously and for those taking the Apothecaries Examination in Dispensing.

Mr Harrod insisted that he gave all the lectures and that practical classes should stick exactly to the syllabus, i.e. macroscopical and microscopical characters of plant drugs. He made it clear that there would be no laboratory classes involving plant chemistry. This was a blow for Joe because he had written a small textbook *Practical Plant Chemistry for Pharmacy Students*, published by Pitman Medical Ltd.[6] He had also written another book for 3rd year Pharmacy undergraduates, *Exercises in the Evaluation of Drugs and Surgical Dressings*.[7] Mr Harrod informed him that these textbooks would not be recommended at Chelsea College. To add further to his concerns was the fact that Chelsea College would have 5 new Senior Lecturers appointed when it became a College of Advanced Technology. Mr Charles Morton, head of the Pharmacy department, had promised Joe that he would have one of these Senior Lectureships, but he was not given one. He was not happy during his first term at Chelsea College and wished that he had not left Bristol.

While he was at Bristol Joe had registered with the University of London as an External Student for a PhD but this had lapsed. He consulted his friend Dr Jim Fairbairn, Reader in Pharmacognosy at the School of Pharmacy, Brunswick Square and Dr TE Wallis, Curator of the Pharmaceutical Society's collection of plant drugs. Jim and Joe had been undergraduates together at the School of Pharmacy and Tommy Wallis had been their Pharmacognosy teacher.

They both encouraged Joe to register for a PhD and helped him through the procedure. Tommy considered that there was scope for a detailed compendium of the anatomy and histology of all the Convolvulaceous drugs on the market because some of the resins were used as substitutes or adulterants of officially recognised medically used resins. Jim thought that chromatographic separations could be used to distinguish between the resins and if this were done in sufficient depth it would contribute towards a PhD thesis.

It was at one of his visits to Brunswick Square that Joe met Dr Bogdan Karminski, lecturer in Pharmacognosy at the Faculty of Pharmacy, Warsaw, Poland (Figure 1). Little did he realise the influence that this would have for his future career.

Joe dreaded his return to Chelsea in January 1958 but he decided to concentrate on research with what little spare time he had available. He examined samples of all of the Convolvulaceous drugs in the museum of the Pharmaceutical Society and compared them with commercial samples. He also utilised the large collection of material medica that Mr Harrod had made at Chelsea College, as well as liaising with colleagues from other Schools of Pharmacy. In addition he obtained samples from AH Millard, Chief Pharmacist to the Malay Government and Director of the Kuala Lumpur Botanic Gardens, who had been a former lecturer at the Bath School of Pharmacy. Another useful supplier of resins was Dr Rohatgi from Kanpur, India, who was a former research student of Tommy Wallis (Figure 1).

Shortly after the start of the Spring term in 1958 his teaching load was reduced because Margaret Lees, a Jacob Bell scholar, was appointed as an Assistant Lecturer in Pharmacognosy. In June, his wife Sylvia, and two boys, Paul and Edward, moved from Bristol and joined Joe setting up home in Hounslow, Middlesex. When he returned to Chelsea for the Autumn term he found that his colleague Georgina Jolliffe had been promoted to Lecturer and that there was a new Assistant Lecturer, John McGreal. Joe still had no lectures allocated to him and he asked Mr Harrod for lectures to be given him. He was surprised to be allocated 8 lectures on Crystallography for 3rd year students. He argued that this subject had no place in Pharmacognosy but Mr Harrod had purchased a crystallography microscope for the sum of £400 and so Joe reluctantly agreed to give 3 lectures. As Mr Harrod was spending more time on departmental administration he needed to reduce his teaching load and eventually Joe was given more lecturing time. Mr Harrod was the most senior member of staff, having been appointed in 1934, and Mr Morton, head of the Pharmacy department, relied on him to keep all of the student academic records. As Mr Morton was intending to retire he added more administrative tasks to Mr Harrod.

Figure 1. Left to Right: Dr Bogdan Karminski and his wife Janina, Dr TE Wallis, Joe Shellard and Dave Phillipson at the British Pharmaceutical Conference, Liverpool, 1962.

It was at the beginning of the 1958 academic year that Dr AH Beckett, head of Pharmaceutical Chemistry, returned from a year-long visit to the USA. At the time this did not mean much to Joe but he soon began to take measure of Arnold Beckett. Arnold was without doubt a very active research worker and he headed a group of scientists including Drs Norman Harper, Alan Casey, George Kirk and Alma Simmonds. They were interested in the stereochemistry of morphine-like compounds and were postulating the structure of the morphine receptor with the aim of synthesising novel analgesics. Joe

https://doi.org/10.24355/dbbs.084-201802161454

planned to start his chemical investigation of Convolvulaceous resins but he had no access to a chemistry laboratory. His request to be able to work in one of Dr Beckett's laboratories was turned down and delayed the onset of this phase of his work. The two colleagues had got off to a bad start.

The new Assistant Lecturer in Pharmacognosy, Mr McGreal, decided that Pharmacognosy was not for him and he resigned. Joe decided to look for a replacement and on the recommendation of Dr Steve Challen of Brunswick Square, he offered the position to Marlion Poulter of Parke, Davis & Co., and she accepted. During 1959 Chelsea College was designated as a College of Advanced Technology (CAT) and an extension was built onto the Manresa Road building. In addition, the great hall was converted into two floors with new staff rooms and laboratories.

Pharmacognosy acquired two new teaching laboratories, one for first and second year students, and one for third year students. Joe ensured that both of these laboratories were equipped for chemical work as well as microscopy. There was a combined office for the 3 lady pharmacognosists and eventually a small office for Joe. Mr Harrod had an office for Pharmacy administration and Mrs Chris Bates was appointed as his secretary. Mr Morton retired as head of the Pharmacy Department and Arnold Beckett was appointed as the new head of department. He had his own secretary, Miss Partington, who dealt with his research interests but had nothing to do with departmental administration. Arnold Beckett began to flex his muscles as head of the Pharmacy Department and decided that Pharmacognosy should be eliminated as a 3rd year option in the BPharm course as he considered it too old-fashioned. When Joe heard this it set the two of them on a collision course.

It was well into the Spring term of 1960 that Arnold Beckett realised that Joe was active in research and was near to completing his PhD thesis. This must have impressed Arnold because he promised to make Joe responsible for Pharmacognosy and shortly afterwards Joe was promoted to Senior Lecturer. Joe was able to complete his chemical research using the facilities in the 3rd year teaching laboratory and he extended his investigation into the volatile components of the resins using gas liquid chromatography at Parke, Davis. He was helped in his research by Mr Tinley a much respected member of the staff in Pharmaceutical Chemistry. His thesis was submitted in early 1960 and after being examined by Tommy Wallis and Jim Fairbairn he was awarded his PhD in June.[8]

Arnold Beckett set up a departmental committee with 2 members each from Pharmaceutical Chemistry and Pharmaceutics and one from Pharmacognosy, namely Joe Shellard. Mr Harrod was the executive secretary and Chris Bates recorded the minutes of the meetings. Arnold Beckett kept the departmental budget and devoted most of the funds to his own research. At this time Chelsea College of Science and Technology was not a School of the University of London and was termed a 'Recognised Institution'. The BPharm syllabus and the examinations as well as the Higher Degrees were administered by the Board of Studies in Pharmacy under the control of Dr Frank Hartley, Dean of the School of Pharmacy, Brunswick Square, and his senior colleagues. Chelsea College was poorly represented in the Board of Studies. Arnold Beckett managed to obtain the status of 'Recognised Teacher' for Joe and his microbiology colleague Chris Bean. As a result they both became members of the Board of Studies in Pharmacy and were able to have input into the BPharm syllabus and examinations, Joe becoming an assistant Examiner in Pharmacognosy for the internal and external BPharm degrees. He became even more recognised for his expertise by becoming a member of the Pharmacognosy Committee of the Pharmaceutical Society and a member of the British Pharmaceutical Codex Committee. The members of the latter committee were mainly from industry and gave Joe a wider experience into the commercial aspects of medicinal plant drugs.

Joe began to form his own research group in the early 1960s and his first research students included Mr Osisogu from Nigeria, Miss MS Pillay from South Africa and Dr Parirokh Shadan from the University of Teheran, Iran. Mr Osisiogu made chemotaxonomic studies on Nigerian species of the Apocynaceae and he obtained his PhD in 1963. Miss Pillay undertook microscopical studies and demonstrated in undergraduate laboratory classes. Dr Shadan made anatomical investigations of the leaves of *Catha edulis* (khat) and the results were published in the *Journal of Pharmacy and Pharmacology* in 1962.[9] Joe had met her by chance one day whilst visiting Chelsea Physic Garden and she agreed to doing research with him. Undergraduate classes in Pharmacognosy at Chelsea College included visits to the Physic Garden where Joe went regularly and he became very friendly with the then Director, Mr McKenzie.

His major research interest became the alkaloid components from species of the genus *Mitragyna,* a member of the family Rubiaceae, and this will be summarised briefly in Part 2. Albert Tackie, a lecturer from the School of Pharmacy, Kumasi, Ghana, was investigating the alkaloids of a Ghanaian species of *Mitragyna* under the supervision of Dr Beckett. Joe persuaded Dr Beckett that it would be more sensible if Albert Tackie did his research in a Pharmacognosy laboratory alongside others working on plant chemistry and where he could help in the supervision of the research. Three members of his Pharmacognosy staff, Margaret Lees (appointed Assistant Lecturer in 1958), David Phillipson (appointed Assistant Lecturer in 1961) (Figure 2) and Peter Houghton (appointed Lecturer in 1972) became active researchers in his group. Joe was very quick in turning research results into scientific papers for publication in journals or for presentation at pharmaceutical conferences. Albert Tackie presented a short communication on *Mitragyna* alkaloids to the British Pharmaceutical Conference at Birmingham in 1961[10] and David Phillipson presented papers in 1963 to the FIP Congress in Munster, Germany.[11,12]

In the early 1960s two analytical techniques became available for analysing the complex mixtures of compounds present in plants. Joe was at the forefront of

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this research, being the first to utilise thin layer chromatography (TLC) and an early worker to use Gas Liquid Chromatography (GLC). In 1961 Jim Fairbairn, Professor of Pharmacognosy at the School of Pharmacy, Brunswick Square, agreed to share with Joe a British Council Scholar, Dr S Talalaj, from the Pharmacognosy Department, University of Warsaw. They were interested in the changing amounts and alkaloid content in *Conium maculatum* (hemlock) and were able to use GLC to separate and quantify the alkaloids present at different times of the day and the season of plant growth.[13] This research was done at Chelsea College. TLC and GLC enabled the separation of alkaloids from species of *Mitragyna* and facilitated the isolation of individual alkaloids as single pure compounds. Within a few years the technique of High Pressure Liquid Chromatography (HPLC) became available and further added to the ability to separate individual alkaloids. Joe was not only a pioneer for these analytical methods but was also a strong advocate for their use, giving lectures and conference presentations in the UK, Europe, the Middle East, Africa and Asia. He also initiated a series of practical courses demonstrating these techniques to other pharmacognosists. In the 1960s there

Figure 2. Joe Shellard, Dougie Harrod, Tommy Wallis, Marlion Wright, Georgina Jolliffe, Dave Phillipson and Margaret Walker on the occasion of Tommy Wallis' 85th birthday, 1961.

were a series of innovations in physico-chemical techniques such as Infrared Spectroscopy (IR), Nuclear Magnetic Spectrometry (NMR) and Mass Spectrometry (MS) enabling the elucidation of chemical structures of small amounts of compounds isolated from plants. Joe readily embraced all of this technology in his *Mitragyna* alkaloid research.

As this research was developing at Chelsea College there were major changes being proposed for Higher Education in Science and Technology in the UK. In 1963, the Robbins Report on Higher Education recommended that CATs became technological universities. This started a period of unrest at Chelsea College as several scenarios presented themselves for future developments including new universities of Hertfordshire, South London, Stevenage and Surrey. Joe was actively involved in the many meetings that took place through his role in the ATTI. The future of Chelsea College was eventually settled in 1965 when the Secretary of State for Education and Science let it be known that the College should remain at Chelsea. Joe moved a proposition at a meeting of the Council of Chelsea College that an application should be made to become a School of the University of London. The motion was narrowly passed and in August 1966 Chelsea College finally became a School of the University of London.

By the mid 1960s Joe Shellard was Chairman of the Pharmaceutical Society's Board of Examiners in Pharmacognosy at a time when the 2-year PhC course was being phased out and there were problems for those students who had failed their examinations. Local Branches of the Pharmaceutical Society were being organised into Regions and linked to specific Schools of Pharmacy. Chelsea College was the academic centre for the Chiltern Region and Joe became the careers officer. This involved him visiting schools in the region, and to help gain the students' interest in Pharmacy he would take with him microscope slides coated with silica gel as mini- TLC plates to demonstrate chromatographic separations of mixtures. His time was also spent in liaising with other departments at Chelsea College that were introducing a common first year syllabus for all students. This could not meet the conditions laid down by the Pharmaceutical Society for the BPharm degree and thus he found himself at odds with all of the other departments. His research and administrative duties were recognised in 1965 when he was appointed Reader in Pharmacognosy.

It was during 1965 that Joe experienced retinal detachment and had to undergo surgery at a time when he was reading through drafts of David Phillipson's PhD thesis. Despite all of the severe bruising around his head resulting from the surgery he turned his lively mind to the minutiae of thesis writing. One of his other staff members, Georgina Jolliffe, was studying for a PhD under the supervision of Dr M Donbrow, senior lecturer in Physical Chemistry who was spending much of his time at the Hebrew University of Jerusalem. He accepted a professorship in Israel and thus left Georgina Jolliffe without a supervisor for her research. She was investigating the physico-chemical properties of grass pollens that caused hay fever[14,15] and, although this was a new field of research for Joe, he accepted to become her supervisor. Under his supervision the research was extended into identifying the constituent amino acids in the pollens.

In the summer of 1964 Joe visited his mother in Minchinhampton and met a local pharmacist who wanted advice as to whether his son Peter could study Pharmacy at Chelsea College. Peter Houghton became a BPharm undergraduate in 1965 and Joe took a great deal of interest in his progress throughout the course. After graduation in 1968 and his pre-registration year, in 1969 Peter started his studies for a PhD under Joe's supervision and eventually joined the staff as a lecturer in Pharmacognosy in 1972 when Margaret Walker (née Lees) resigned.

After David Phillipson had obtained his PhD in 1965 he requested leave of absence to spend a sabbatical year at Ohio State University in the USA. This was granted for

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the 1967/68 session so Pharmacognosy at Chelsea was short of a staff member. Joe invited Norman Bisset to accept a one year temporary lectureship. Norman was researching the alkaloids of species of *Strychnos* at Gif-sur-Yvette, Paris, and had previously been an active researcher as a Colombo Scholar involved in the phytochemical survey of Malaya. Norman accepted the temporary lectureship and received his PhD in 1968. Joe did not want to lose such an expert in phytochemistry after one year and it was as a member of the Council of Chelsea College that he noticed that there was one academic staff vacancy in the Pharmacy Department. He persuaded Profesor Beckett to advertise for a lecturer in Pharmacognosy and it was not surprising that Norman was appointed. It came as a complete surprise to David Phillipson that, on his return from the USA, he found that he had a new colleague. Joe handled this situation very well and he encouraged both of them to carry on with their research and publish research papers while he 'watched their backs'. It is partly due to his attitude that they became close colleagues and friends. In 1968 there were 7 pharmacognosists in the Department of Pharmacy at Chelsea College, Joe Shellard, Dougie Harrod, Georgina Jolliffe, Norman Bisset, David Phillipson, Margaret Lees (later Walker) and Marlion Poulter (later Wright).

As Chelsea College continued to expand, lack of space became a major problem and various additional premises were acquired. One of these was at Hammersmith where there was a pharmacognosy research laboratory. Eventually alterations were made to the main Manresa Road site enabling Pharmacognosy to be housed in new laboratories.

In May 1968 the Queen Mother, Chancellor of the University of London, visited Chelsea College. Joe was able to discuss his views on homoeopathy, agreeing with the Queen Mother. Georgina Jolliffe set up a microscopical demonstration showing the characteristic trichomes of *Cannabis*. There were undergraduate students at each microscope and the Queen Mum was fascinated. Her visit to the Pharmacognosy laboratory was scheduled to last 6-7 minutes but lasted for 25 minutes. This resulted in her agreeing to miss out the next laboratory where Professor Beckett was demonstrating the analyses of horse doping. This did not help the antagonism that was growing between Professor Beckett and his Reader in Pharmacognosy.

During the Easter vacation of 1970 Joe received a letter from the Vice Chancellor of the University of London informing him that the title Professor of Pharmacognosy had been conferred on him. He always enjoyed parties and he organised a series of celebrations. He and his wife Sylvia hosted a splendid meal in the Governor's dining room at Chelsea College. They invited his pharmacognosy colleagues and their spouses, together with Dr Tommy Wallis and Professor Jim Fairbairn. After his long and hilarious speech, Joe requested that there should be no other speeches but Tommy Wallis refused to accept this. He not only expressed his congratulations to Joe but also his pleasure and pride in having two of his former students as Professors of Pharmacognosy in the University of London.

A less formal party was organised for other members of staff, colleagues and friends. When it was getting quite late a member of Pharmaceutical Chemistry complained that the barrel of free draught beer was now empty. In typical Shellard fashion the answer was "Don't bother me with such matters, just go and order another barrel in my name". He gave wonderfully witty speeches at many social events, often impromptu, and they always carried the message about the importance of Pharmacognosy and left his audiences with stomach ache through laughing.

Each Christmas he invited his colleagues to a special lunch with one invited guest and plentiful supplies of Hungarian Bull's Blood red wine. He was always very good acting on the stage and the pharmacognosists gave performances at the Pharmacy Department Christmas Phollies. Several of these were based on the then popular TV series 'Till death us do part' and Joe, who bore a remarkable physical resemblance to the TV character, played the bigoted Alf Garnet. On the first of these performances he was sat at the breakfast table, hidden behind a newspaper, with his wife Else (Georgina Jolliffe), daughter (Marlion Poulter), and his Scouse-Git son-in-law (David Phillipson). As he slowly lowered the paper to reveal the top of his bald head, then his spectacles, followed by his moustache, then full face, the audience erupted and it was several minutes before the dialogue could be commenced. When he shouted at Else calling her a "silly moo" the audience reaction went into overdrive with stupendous cheering and clapping. Could this be the serious academic, the strong believer in his chosen subject, the researcher, the University administrator? In contrast he presented in 1969 a special memorial lecture to Steve B Challen at the School of Pharmacy, Portsmouth, entitled 'Twenty years of British Pharmacognosy'. His growing expertise in chromatographic techniques led him to edit a book on quantitative paper and thin layer chromatography in 1968.[16] He was a very strong advocate for his subject.

When Marlion Poulter resigned from his department in 1970 it proved difficult to provide funding for a full time lectureship replacement and so Joe ascertained what funding was available. He instigated a scheme to invite young pharmacognosists from Europe to spend 6 months at Chelsea College. He was constantly thinking about the content of his undergraduate courses and in 1971, after a busy schedule of external examining and visits abroad, he devised practical classes that required less memory for identifying plant drugs and initiated research-style projects.[17]

In 1972 Margaret Lees (m. Walker) resigned and Peter Houghton took over her lectureship. David Phillipson accepted a senior lectureship at Brunswick Square in Professor Fairbairn's Department of Pharmacognosy. His position at Chelsea was taken by Dr Peter Hylands.

There was a special ceremony at Chelsea Town Hall in July 1973 when Sir John Wolfenden (later Lord) was installed as the first President of Chelsea College. A number of honorary fellowships were presented and Joe, as Chairman of the Board of Studies in Pharmacy, introduced two of them, Professor Donald Hey and Mr Cyril Maplethorpe.

As a result of his visits to Eastern European countries and his work on the *British Herbal Pharmacopoeia* Joe

https://doi.org/10.24355/dbbs.084-201802161454

advocated that UK Pharmacy should become involved in Herbal Medicine. There was opposition to this from prominent members of the Pharmaceutical Society but he persuaded the Council of the Society to have a symposium on Herbal Medicine[18] and it was held at Bradford University in May 1974. The text of Joe's lecture 'Herbal Remedies and the Pharmacist in Europe' was published privately. In the same year the text of his inaugural lecture as Professor of Pharmacognosy, 'The Wheel has turned Full Circle' was also published privately (Figure 3).[9] The centenary of the death of Daniel Hanbury, a founder member of the Pharmaceutical Society, was marked in April 1975 and Joe presented a lecture at the Society with Sir John Hanbury as chairman.

Figure 3. British pharmacognosists with Cyril Maplethorpe and his wife on the occasion of Joe Shellard's inaugural lecture, 1974. L to R: Bill Evans, Billy Binns, Cyril Maplethorpe, Mrs Maplethorpe, Betty Jackson, Dave Phillipson, Joe Shellard, Frank Fish, Jim Fairbairn, Norman Bisset, Dougie Harrod, Peter Houghton, Peter Hylands, Roland Hardman, Georgina Jolliffe, Richard Schmidt, Margaret Walker, Liz Williamson, Fred Evans, Margaret Roberts.

He liaised with a Swiss company, Biostrath, that specialised in the manufacture of herbal products. Permission to sell some of their products in the UK was refused by the Medicines Commission but Joe managed to help them secure approval for 6 of their 8 products. He also collaborated in the production of a film on the life of Paracelsus (Theophrastus von Hohenheim, 1493-1541). The film came out in 1977 and Joe introduced it at a screening held at the Royal Institution.

When Dr Malcolm Gavin retired as Principal of Chelsea College in 1974 he was succeeded by Professor David Ingram from Keele University. The new Principal commenced holding regular meetings with the Heads of Departments but Professor Beckett was often absent due to his frequent visits to the USA. Joe attended these meetings as a deputy but the Principal proposed that Joe should be made Head of the Pharmacy Department. Professor Beckett threatened legal action and so the Principal demanded to know when he would be absent from the college. He proposed that Joe be made responsible for Departmental resources including staff, space, equipment and also finance. Joe was made Assistant Head of the Pharmacy Department and this did not meet with the approval of some of his colleagues, but the Principal had his way. When Joe was informed that the allocation of money for the Pharmacy Department was £36,000 for the year 1975-6 he was amazed. Professor Beckett had told his staff that there would be less than £10,000 for the year. When Joe presented this information to the heads of Pharmaceutical Chemistry, Pharmaceutics and Microbiology, they too were amazed. Opposition to Joe from within the Department of Pharmacy faded rapidly. One of the immediate problems that faced him as Assistant Head of Department was that 3 members of staff had refused to collaborate with their section head in teaching practical classes to undergraduates, so Joe held a series of meetings to correct this situation. In September 1975, Dougie Harrod retired after a career at Chelsea College that had begun in 1933. Despite their early disagreements when Joe joined

Figure 4. Mr Harrod's 80th birthday, 1990. L to R Dave Phillipson, Marlion Wright, Joe Shellard, Peter Houghton, Bob Hider, Georgina Jolliffe, Dougie Harrod and Margaret Walker.

the staff at Chelsea, he respected Dougie and appreciated all of the work that he had done for departmental administration (Figure 4).

In November 1975 a new hall of residence, The Malcolm Gavin Hall, was built at Tooting and the opening ceremony was a splendid occasion with notables including the Chancellor of London University, the Queen Mother. As

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Figure 5. Pharmacognosy academic and technical staff and research students at Chelsea, 1978.

she processed through the audience dressed in her academic robes she noticed Joe, stopped the procession and said to him "Oh, I remember you are the professor who believes in homoeopathy" and continued talking to him, holding up the academic procession.

Although Joe took on more and more administrative duties at Departmental and College level he continued to pursue his research interests, particularly into the alkaloids of *Mitragyna* species. By 1978, when he retired, the research groups in Pharmacognosy continued to make substantial contributions to the academic achievements of the Department of Pharmacy at Chelsea College (Figure 5).

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To be continued in Part II.

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https://doi.org/10.24355/dbbs.084-201802161454

Madras Medical Journal

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During my visits to different institutions within India and abroad in search of archival source material for my pharmaceutical history research, I chanced to come across certain obsolete journals which provided me with some useful information. I decided to write about these former periodicals. Before I discuss the Madras Medical Journal I will give a brief introduction to two other publications the articles on which have already gone on record.

Indian Journal of Pharmacy

While working at the National Library in Calcutta I came across references to the *Indian Journal of Pharmacy,* which was published from Calcutta towards the close of the nineteenth century. We in the pharmacy profession had known only one such title, which started appearing from Banaras in 1939.[1] This intrigued me and I started to search for this older journal, but searches at different prominent Indian libraries and the Royal Pharmaceutical Society of Great Britain Library proved to be of no avail. However, to my pleasant surprise I was able to trace some issues of the *Indian Journal of Pharmacy* (Calcutta) at the College of Physicians of Philadelphia in Philadelphia, PA, in the USA. The existence of this journal stood confirmed. The journal started publication in January 1894 and the last issue found was for November 1896.[2] It covered trade and professional interests. It can be safely said that the journal was the first pharmaceutical journal of British India.

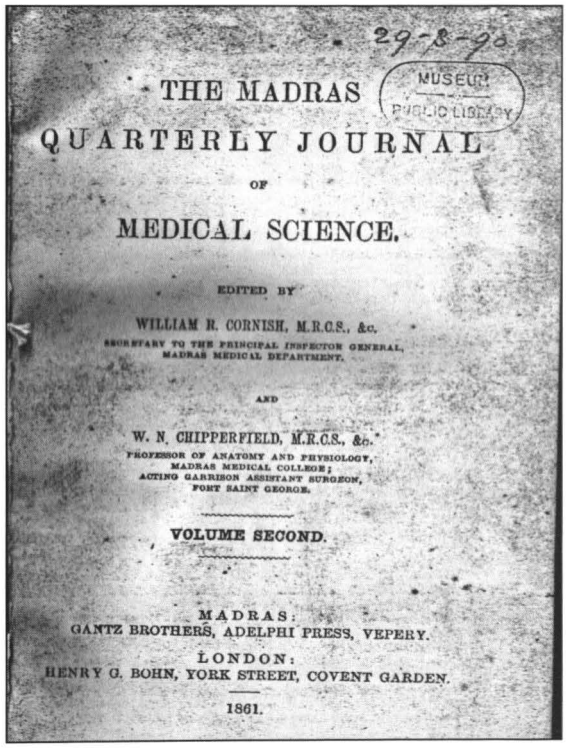
Indian and Eastern Druggist

When I started my work on pharmacopoeial history and was looking for source material at the Royal Pharmaceutical Society Library in London in August 1988, I was introduced to the *Indian and Eastern Druggist*, which was not known to me. The journal first made its appearance in 1920, not from India but from London, the capital of the British Empire.[3] In 1937 the name of this journal was changed to *the Indian and Eastern Chemist*, and later in the year it started publication from Calcutta, and lasted there for about four years.

Coming to the main theme of this article, it was during my visits to Madras (now Chennai) and work at the Connemara Public Library that this nineteenth century medical journal came my way.[4,5]

The Madras Quarterly Journal of Medical Science

The Madras Quarterly Journal of Medical Science started publication in 1860, and all the published volumes except the first volume were available to me at the Library. After the first volume two volumes were published every year. William R Cornish, Secretary to the Principal Inspector General of the Madras Medical Development, and WN Chipperfield, Professor of Anatomy and Physiology at the Madras Medical College, were the editors. Later, from volume four, the editorship was taken over by Howard B Montgomery, who was Garrison Assistant Surgeon, Fort St George, and Professor of Botany and Materia Medica at Madras Medical College. From the twelfth volume,Howard B Montgomery, now designated Secretary to the Sanitary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THE MADRAS
QUARTERLY JOURNAL
OF
MEDICAL SCIENCE.
EDITED BY
WILLIAM R. CORNISH, M.R.C.S., &c.
SECRETARY TO THE PRINCIPAL INSPECTOR GENERAL, MADRAS MEDICAL DEPARTMENT.
AND
W. N. CHIPPERFIELD, M.R.C.S., &c.
PROFESSOR OF ANATOMY AND PHYSIOLOGY, MADRAS MEDICAL COLLEGE; ACTING GARRISON ASSISTANT SURGEON, FORT SAINT GEORGE.
VOLUME SECOND.
MADRAS:
GANTZ BROTHERS, ADELPHI PRESS, VEPERY.
LONDON:
HENRY G. BOHN, YORK STREET, COVENT GARDEN.
1861.

Title page of Volume Second of *The Madras Quarterly Journal of Medical Science.*

Commissioner, was joined by Henry King, Acting Surgeon 4th District, Madras, for continued editing of the journal.

Volumes one to twelve constituted the First Series of the journal for which a consolidated index was prepared (1868). The Second Series started in 1869 but only one volume was published. 'After an irregularly intermittent existence of thirteen volumes' the *Madras Quarterly Journal of Medical Science* was merged into the *Madras Monthly Journal of Medical Science*, which started publication from January 1870. The publishers remained Gantz Brothers, Adelphi Press, Madras all through, except for the last number (1873) which was published by Caleb Foster and Co., Madras.

The format and arrangement of the *Monthly* remained similar to the *Quarterly* to a considerable extent.[6] The first part was to consist of original matter, discussing questions of hygiene, medicine, and medical politics, and items of medical news; these and correspondence were to constitute the principal features in which the new periodical was to differ from its predecessor. Next there were reviews or notices of medical or scientific works. As before, information about original cases and extracts from other British, Continental, and American journals

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was to be provided. Further, publication of all orders of the Government in Council or the Commander-in-Chief affecting members of the profession was to continue. The journal with its new embodiment started publication with high hopes.

Six issues of the *Monthly* were completed in 1872 somehow, but the journal on the whole did not receive much encouragement or patronage.[7,8] There were only a few regular contributors. The editors experienced difficulties in the conduct of the journal. They struggled against many adverse circumstances and finally to their dismay had to announce:[9]

> We have regretted much that the material that has lately found its place in this Journal has not been of that nature which we could wish, but we know that our subscribers will overlook our shortcomings in this matter when they are informed that our contributors have been steadily decreasing in number. We have lacked contributors more than subscribers to this Journal, and it is from want of suitable pabulum that we are unwillingly compelled to bring this publication to a close.

The only medical journal in the Madras Presidency at the time and one of the oldest medical journals in India met an unnatural death.

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Evans Medical of Speke, Liverpool

Dr Peter M Worling
Edinburgh

If you Google 'Evans Medical', among the results listed is Evans Medical plc 'one of Nigeria's largest pharmaceutical manufacturers'. Clicking on this, if you get through, takes you to an American site with twenty five viruses, so you are advised **not** to go on to this site. Further search reveals some scattered historical information about Evans Medical at Speke and there is also some information about Evans Medical plc, Lagos, although the financial results go no further than 2011. Not, I thought, much of a record for what was once a substantial manufacturing company.

The beginning

John Evans in partnership with his brother Edward opened a druggists business in Worcester, in 1809. This was successful but in 1818 John left his brother to establish a business in the vinegar trade and moved to London to join Kempson, Yates, Evans and Parkinson, wholesale druggists at 40 King Street, Snow Hill, as a partner. He was obviously ambitious and three years later in 1821 he formed his own company with Daniel Stable called Stable Evans and Company, with premises at 62 Wood Street and at London Wall. Stable left the partnership in 1823 but in 1828 Sydney Lescher joined the partnership and the company with the title Evans and Lescher moved to 4, Cripplegate Buildings, London.[1]

In 1833 a major expansion of the business took place when J.S. Lescher moved to Liverpool to develop premises at 15 Fenwick Street and then moved to 8, Lord Street. It is assumed that as Liverpool was a major port for importing the crude drugs that Evans were using in their business, they believed there would be an advantage in having premises in Liverpool. The venture was obviously successful. The three sons of John Evans were employed in Liverpool and when Lescher returned to London in 1835, John Hilditch Evans was put in charge and the business renamed Evans Sons & Co.[2]

The company followed the route of development as a wholesale and manufacturing druggist. Drug mills and laboratories were opened in Fleet Street, Liverpool in 1846 and the company established a significant trade in London and the North. The Lord Street premises were moved into premises belonging to the Bank of England in Hanover Street in 1848. These had been damaged in a fire in 1847 and a new building was erected on the site which became the headquarters of the company (Fig.1).

The London branch was run separately from Liverpool but a very close cooperation was maintained between the two companies. A Canadian company Lamplough & Campbell of Montreal Canada was acquired in 1866 and renamed Evans Mercer and Co., and incorporated in 1881 as Evans Sons and Mason Ltd. It does not seem to have had much influence on the parent other than as an outlet for their products. The companies over the years had a number of different partners and changes of name until in 1902 both London and Liverpool were amalgamated to form one company, Evans Sons, Lescher and Webb Ltd, wholesale

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and export druggists (Fig. 2), a name with which many will be familiar.[3]

From the early 20th century Evans developed their company as a comprehensive wholesale distributor supplying a wide range of sundries as well as drugs (Figures 3,4). They were also interested in the manufacture and supply of the newer ethical medicines that were developed. A new venture was started in partnership with Liverpool University; originally called the Incorporate Institute of Comparative Pathology, with premises in Runcorn. This was acquired in 1911 and renamed in 1929 the Evans Biological Institute. Its brief was to carry out research into animal and human diseases. It developed a range of interesting products starting with Atoxyl (arsanilic acid) in 1905 as a treatment for trypanosomiasis (sleeping

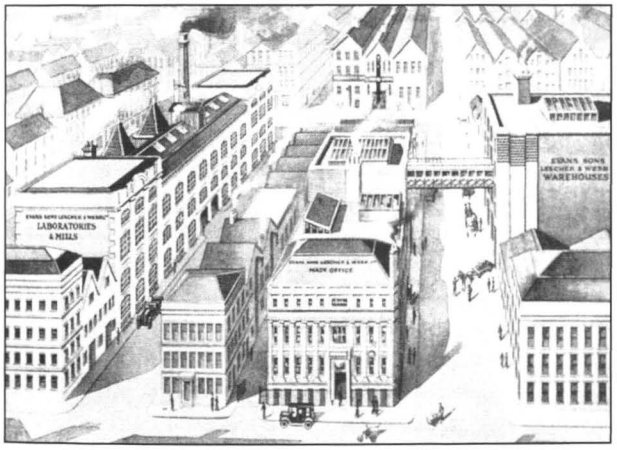

Figure 1. The Evans factory, Hanover Street, Liverpool.

sickness). Other products included Hepatex Oral, a liver extract for pernicious anaemia, sulphanilamide (Streptocide) for puerperal sepsis in the 1930s, diphtheria and tetanus antitoxin, cholera and typhoid vaccine, and heparin (Pularin) and hyaluronidase. In 1922 Evans exhibited at the British Industries Fair and listed themselves as 'Manufacturers of Fine Chemicals, Drugs, Pharmaceutical and Toiletry preparations, Vaccines, Pills, Tablets etc.'

In May 1941 the Hanover Steet premises were destroyed in an air raid and plans were drawn up to build a new

Figure 2. Evans Sons, Lescher & Webb factory

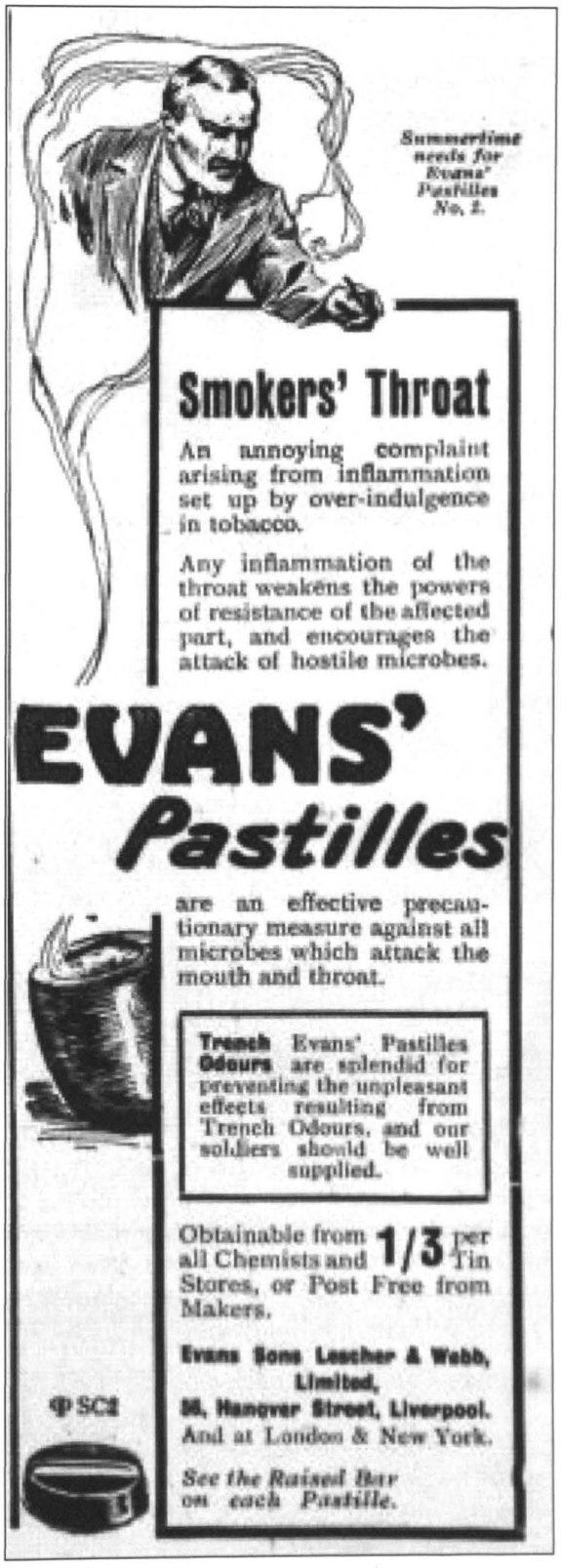

Figure 3. Evans Sons, Lescher and Webb advertisement during World War I.

factory at Speke on a new site. This was completed in 1943 (Figure 5) and started production in December. After the war the expansion of the company continued; overseas markets were developed and subsidiaries established in India, South Africa, Australia and Pakistan.

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Figure 4. Druggists sundries from Evans catalogue.

Evans continued to have a significant interest in wholesale distribution. At the end of the 1940s, following the introduction of the sulphonamides and the antibiotics, growth of new 'ethical' pharmaceuticals continued, with an ever increasing number of packs and forms. However the total volume was still small and the bulk of supplies by wholesale were galenicals, as liquids and powders, tablets and ointments. In the 1940s supplies were generally obtained and delivered from a local wholesaler, usually the next day in major centres of population and often only three times a week in the country, although urgent orders for dispensing items were sent by bus or carrier.

With the introduction of the National Health Service in1948, both volume and value increased together with increasing competition. Wholesalers telephoned for orders, and delivery the same day became the norm. The major suppliers for standard drugs were Evans Medical and British Drug Houses. BDH had been formed in 1909 by the amalgamation of four London wholesalers: Baron, Harvey & Co.of Giltspur Street; Davy Hill & Co.; Hodkinsons; Clark & Ward of Park Street; and Heron, Squire & Francis of Southwark Street. The business moved into new warehouses in Graham Street, Islington.

Initially both companies supplied their standard drugs to chemists in many parts of the country. With the increase in business and reduced delivery times this became more difficult and retailers found it easier to purchase their supplies in smaller quantities from local wholesalers. In order to retain their drug business both companies expanded their wholesale interests. In the case of Evans they followed the route of both acquisition and opening branches of the company in strategic locations.

Figure 5. Evans Medical at Speke, Liverpool.

EVANS MEDICAL BRANCH OPENINGS

1946 New Apothecaries, Glasgow appointed agents, 1963 acquired by Evans.
1951 Philip Spender and Daker & Co, Gateshead. acquired
1952 Evans Medical Ruislip, new branch opened. Don Bryan, Swansea acquired
1958 Evans Medical, Kingswinford, Birmingham, opened
1959 Evans Medical (NI) Belfast, established.
1960 Gilbert Jackson, Sheffield, acquired.
1961 Evans Medical, Heywood, opened.
1962 Lofthouse and Saltmer, Hull. acquired.
1964 Evans Medical, Footscray opened
1965 Evans Medical, Enfield opened.
1967 Evans Medical (Northern Ireland) opened.

BDH countered mostly by the acquisition of well established wholesale houses. They formed a national network through the acquisition of Ferris, Bristol; J.R. Gibbs, Bristol and Paignton; Bradley and Bliss, Reading, Bexhill, Sandwich and Croydon (Figure 6); Woolley and Arnfield, Manchester and Stockport; Knights of Nottingham and Birmingham; and Rowland James of Swansea and Cardiff. As a consequence Evans and BDH had wholesaling interests of something near equal size.

This was the point where Glaxo became involved. After the war Evans was quite successful at developing their business. They had been expanding their overseas interests and their UK wholesaling activities were profitable. Despite this the company was quite small, capitalised at only £3 million. They realised that as a consequence they were vulnerable to a takeover. In June 1960 they were approached by Fisons with a proposal for amalgamation. Evans chairman IVL Fergusson approached Glaxo as a defensive measure and eventually it was agreed that Glaxo

https://doi.org/10.24355/dbbs.084-201802161454

Figure 6. BDH acquires Bradley & Bliss. Front row L to R: Treves Brown BDH; N Jefferies BDH; GG Hammond Bradley & Bliss; F Griffin BDH; BD Bird Bradley & Bliss. [4]

would acquire Evans as a subsidiary but its identity would be retained.

Sir Harry Jephcott was chairman of Glaxo at that time. He had steered Glaxo successfully for many years and during this time made a number of acquisitions. These were because opportunities arose at the time and did not necessarily fit in to an overall strategic plan. Acquisitions included Matburn Holdings, a surgical equipment manufacturer, Farleys Infant Food and Edinburgh Pharmaceutical Industries, which was acquired in 1963. Macfarlane Smith joined Glaxo Laboratories while Duncan Flockhart and Allied Labs became part of Allen and Hanburys. This brought the wholesaling interests of Duncan Flockhart and Macfarlan Smiths into Glaxo which, added to the New Apothecaries acquired by Evans, gave the group a substantial investment in wholesaling with a turnover in 1965 of £16 million.

By 1965 the pharmaceutical retail market was changing. The number of independent pharmacies was falling and the retail groups were growing in importance and purchasing power. Glaxo believed that there would be an advantage in Evans and BDH amalgamating their wholesaling interests so that a larger wholesale group would have greater negotiating power. Sir Austin Bide, at that time Deputy Chairman, approached BDH to discuss the formation of a jointly owned company. BDH were sympathetic to this idea and in June a jointly owned company was formed. It was called Vestric as this was a name that Glaxo had already registered as a trade name for veterinary products. The Board of Directors consisted of FrankW Griffin who was MD of BDH, AE Bide deputy chairman of Glaxo, WA Kinnear as MD and KMN Fergusson, as Finance Director (Fig. 7).

A year later in August 1967 Glaxo approached BDH to discuss a merger. BDH had earlier entered into an arrangement with Mead Johnson & Co. of Indiana, USA, to collaborate in research and marketing. Mead had taken a 35% holding in BDH and they had first of all to be consulted. They were however agreeable in principle to selling their holding. The deal was completed in January 1968 and Vestric the wholesaling company, which included the Evans wholesaling interests (Fig. 7), became a wholly owned subsidiary of Glaxo. The manufacturing side of Evans Medical Speke and its subsidiaries became a separate division. Glaxo was now made up of nine operating companies, with in addition, subsidiaries and overseas branches, some competing in the same markets (Fig. 8).

Under the Chairmanship of Sir Harry Jephcott various strategies for the future development of the Group had been discussed, but the company developed as opportunities arose. When Sir Alan Wilson took over in the late 1960s he was conscious that as a pharmaceutical company research and development had been underfunded and he increased the spending as well as increasing manufacturing capacity. Wilson was well aware of the complexities of the Group

Figure 7. Vestric is formed. In centre is WA Kinnear, to his right (with pipe) is KMN Fergusson, Financial Director and son of Fergusson of Evans Medical.

https://doi.org/10.24355/dbbs.084-201802161454

Figure 8. Evans Medical at Ruislip. Peter Worling (2nd row, centre left without glasses) arrives to take over from manager Roy Lever, to his left.[5]

structure and in particular the disadvantage of the separate companies running their own business without reference to the overall aims of the Group. He introduced a more integrated structure by appointing main board directors to the subsidiary companies' boards.

Sir Austin Bide was appointed Chairman in 1973 and he was responsible for a radical restructuring of the company, forming a holding company Glaxo Holdings. He retained the goodwill of the separate companies by keeping their names but introduced designated responsibilities for members of the main board for the separate companies so that an integration and rationalisation of their activities could be achieved. This led to significant cost savings and improved efficiency .

When Sir Paul Girolami took over as Chief Executive in 1980 his first job was to oversee the launch of Zantac and the move of Glaxo into the United States, both major undertakings. He then turned his attention to the structure of the Group. At a Chief Executives meeting in 1984 Girolami raised the question about the future development of the Group. He believed that the interests of the group were spread too wide and some concentration of effort into fewer areas should be considered. Various ideas were discussed; one idea was to pursue the development of two separate divisions. One would concentrate on the development of the ethical medical and prescription departments the other on developing a range of proprietary medicines for counter sale. This would ensure that the Group had a foot in both markets and in particular as the competition in ethical pharmaceuticals became more intense the counter medicines market would help to maintain turnover. In the end Girolami decided that Glaxo should concentrate its efforts and its investments in what he considered was its core market, the research and development of prescription medicines. It was decided that the companies who did not contribute to this basic aim should be sold.[4]

ERC Farmer, Chief Executive of Glaxo Pharmaceuticals and Chairman of Vestric believed that one solution for the company was to structure it as a National Wholesale distributor for the industry with its shares being jointly held by a consortium of pharmaceutical manufacturers and he discussed this with members of the industry. A major problem was that Resale Price Maintenance had been abolished in June 1970. Ethical and proprietary medicines were exempted from the ban, but prices could no longer be maintained on a wide range of toiletries, perfumery, dressings and many sundry items. Although the proportion of NHS dispensing was steadily increasing, sales over the counter still accounted for some 40% of turnover in 1975. This range of products could now be supplied by other retailers at discounted prices. Pharmaceutical wholesalers realised that unless their customers could compete on price, there would be a loss of business and to help them compete a number of 'Voluntary Trading Schemes' were introduced. These offered monthly special offers and discounts to enable the retailer to compete. They were also aimed at tieing the retailer to the wholesaler.

These schemes gave discounts on counter products where price maintenance no longer applied. In January 1974 the wholesaler Unichem introduced a differential discount scheme with the rebate based on total turnover which effectively gave a discount on ethical medicines. Glaxo would not let Vestric discount medicines and sales and profit began to fall. Macarthys, a major wholesaler, introduced discounts and then eventually in January 1981 Vestric introduced a discount scheme which offered 9% on purchases over £1,000 per month on manufacturers who allowed a wholesale discount of 15% and 6% on others. All wholesalers followed suit giving an average of 5% discount.

To survive, the costs of operating the company had to be reduced. Branches with overlapping territories and the less efficient branches were closed. By 1984 over 78 wholesale branches were closed nationally and Vestric reduced the number of branches to 20. The cost of redundancies and branch closures resulted in a turnover of £25 million producing a loss. Manufacturers who had been approached to join in a consortium were not interested in proceeding to invest in what appeared to be a loss-making business.

https://doi.org/10.24355/dbbs.084-201802161454

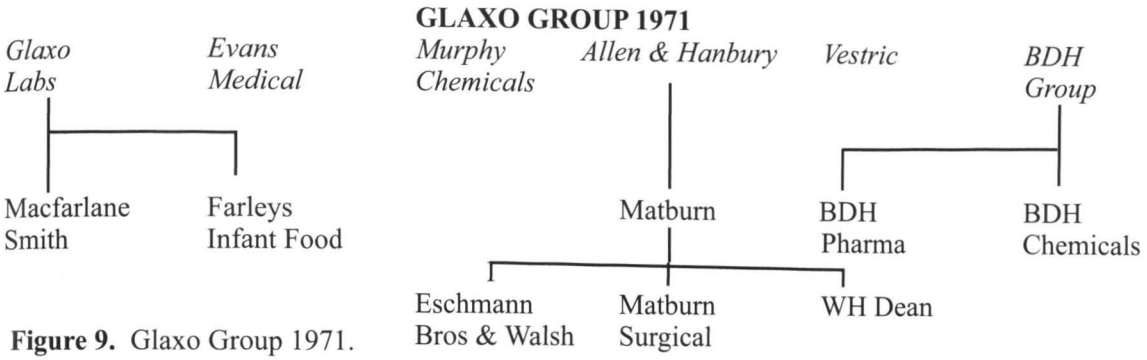

Figure 9. Glaxo Group 1971.

Discussions were held with a number of wholesale companies, both in the UK and in Europe, and eventually Vestric Ltd. was sold to AAH Ltd. in 1984.[8] This company owned a group of retail shops and a wholesaler, Hills. They had regional coverage and were interested in developing their wholesale service on a national basis. Glaxo were therefore able to dispose of all of their wholesaling interests including what had been the Evans Medical and BDH wholesaling companies. Glaxo were also able to dispose of Matburn (Holdings) in 1985, the group of three surgical engineering companies and Farley Health Products under which the baby food products had been consolidated.

Evans Medical, Speke continued as part of the Group and were responsible for the manufacture of a wide range of pharmaceutical products. Investment had been made in the Speke factory which improved its productivity and efficiency. There were problems associated with the factory which were largely due to its construction during wartime, which had created a number of difficulties; nevertheless Evans Medical took over the responsibility for the Group's generic medicines business in the UK.

Initially the turnover and profitability increased, mainly due to the introduction of new generic products and the sale of diamorphine. However, competition soon increased from small manufacturing units with low costs and this led to price reductions. Bernard Taylor, Group Commercial Director, introduced a range of branded generics under the banner of GX but this was not successful because customers were not prepared to pay a premium price for products generally available. The generic market was further complicated for Glaxo because they had generic products competing with some of their premium proprietary medicines, and it was decided to withdraw from the generic market. At one time some 2,000 products and packs were produced at Speke, the main profit coming from aerosol production and there was also a Biological Division responsible for producing vaccines.

The problem of the future of Evans Medical was solved by a management buyout of the company, which was renamed Evans Health Care. Subsequently, Bernard Taylor resigned from Glaxo to take up an appointment as Chairman of a company Medirace. It changed its name to Medeva and in 1990 acquired Evans Health Care. They did not use the name Evans and it was no longer part of our pharmaceutical industry.

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The paper was presented for Peter Worling at the Spring Conference, Liverpool, March 2013 by Ainley Wade.

Endnotes and References

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4. The author is looking over Hammomd's left shoulder). The others are the branch managers of Bradley and Bliss. I was the sales manager. Hammond told me that BDH had said he had the choice of selling to them or they would open a branch next door and close him down!

5. I was sent for by Sam Lennox at the formation of Vestric. He said "we now have two Sales Managers and you have lost the toss. Anyway you don't know how to run a branch so you are to take over Ruislip". The picture shows Roy Lever and me in the middle, the left hand is the office staff and the right hand the warehouse staff. The point was that Ruislip branch was known as London House and as well as being responsible for wholesale deliveries in West London and the country it also handled all the export shipping for Evans. Trucks came from Speke overnight and then took the cases to the ships in the docks. It was the one part of the branch that ran smoothly, the wholesaling operation was in a mess and needed a lot of work.

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8. Paul Girolami sent for me and told me that he had decided that Group would concentrate on the market for prescription medicines. (I had tried to persuade him at the Conference of the benefits of a broad based group covering counter medicines as well as prescription medicines.) I was told to sell Vestric or if not close it down. He also said "I am not going to sell it to you (me) because you would lose your money! I travelled over to America and Europe to find a buyer but in the end more by good luck rang up AAH who had acquired Hills and who were interested in expanding. Girolami took over and concluded a deal which was either £10 or 15 million for the lot!

https://doi.org/10.24355/dbbs.084-201802161454

Book Review

Herbs and Healers from the Ancient Mediterranean through the Medieval West: Essays in Honor of John M. Riddle

Anne Van Arsdall and Timothy Graham (eds), Farnham, Surrey: Ashgate, 2012, pp 394 (hardback price: £70.00).

Many scholars now believe that the medicine practised during ancient and medieval times has been greatly underestimated, and that practitioners' knowledge of medicinal plants and their rational use was much more sophisticated than previously thought. As a result there is much research currently underway by historians, plant biologists and others to see if there are further secrets to be unlocked.

One of the pioneers of this research is John M Riddle at the University of North Carolina. Riddle's books include *Diascorides on Pharmacy and Medicine* (1985) and *Eve's Herbs: A History of Contraception and Abortion in the West* (1997). This book, a compilation of essays on subjects close to Riddle's heart, is the fourth in Ashgate's *Medicine in the Medieval Mediterranean* series.

The book takes a broad historical sweep, from the first century BC to the late Middle Ages, and has a wide geographical spread, from central Asia to western Europe. The opening chapter, by John Scarborough, provides a scholarly account of pharmacology and toxicology at the court of Cleopatra (around 70 to 30BC). Other colourful characters featuring in this book include the healers Gariopontus of Salerno and Constantine the African. The latter was an eleventh century monk, the importance of whom in the history of European medicine can hardly be over-stated, as Winston Black demonstrates. He suggests that Constantine should be credited with bringing rationality back into medieval medicine, for his translations of Arabic and Greek medical works, and his original contributions. Black examines the influence of one of Constantine's key works, his *Liber Graduum* (the book of degrees), the earliest medieval text in Latin to embrace Galen's theory of simples, and explores references to Constantine in north European medical verse. In another chapter, Faith Wallis discusses the reasons why the *Liber Graduum* never gained admission to the Articella (the medieval compilation of medical texts), but nevertheless had a significant impact upon it.

In his chapter John Crellin reflects on *Eve's Herbs,* and on interpreting evidence about therapeutic effectiveness. Maria Amalia D'Aronco, editor of *The Old English Illustrated Pharmacopoeia,* examines attempts to identify the plant known as *elehtre*; it is usually considered to be the lupin because of its colour (amber or *electrum*). The ubiquity of herbs and herbal healing in the medieval world is illustrated by the extent to which they were satirised in Middle English texts, explored in a chapter by Linda Ehrsam Voigts. Karen Reeds assesses the claims for Saint John's Wort in the age of Paracelsus. She notes that the glandular dots in its leaves are so distinctive that any description or picture that involves them can reasonably be assumed to be *Hypericum perforatum.*

The final chapter provides a review of existing resources available to researchers, including the Anglo-Saxon Plant Names Survey (ASPNS) and the Dictionary of Old English Plant Names (DOEPN). It then describes the an important new internet-based system, the Medieval Plant Survey (MPS). This data-base includes not only plant name indices listing nearly 10,000 plant names, but also large numbers of historical texts, ingredients mentioned in medical formularies, and online sources.

Some parts of the book are, however, less readily accessible than others; some 24 pages of Latin text are reproduced in full, and one chapter is in German, although a short abstract is provided in English. There are some 26 pages of tables providing detailed lists of substitutes, part of a chapter which revisits substitution in ancient pharmacy. A further 16 pages provide tables giving the alternative terminology used in four important manuscripts from this period, including the *Circa instans.*

This then is a scholarly work which will be of considerable interest to researchers working in this field, including historians and plant biologists. But the book also offers much of interest to pharmaceutical historians. It makes important contributions to our knowledge about how medical and pharmaceutical ideas moved across national, linguistic and cultural borders; about how they were translated, modified, adapted and improved, between Greek, Latin and Arabic; and about how they came to lay the early foundations for pharmacy in Britain.

The book shows also that Anglo-Saxon medicine had a rational basis, and elaborated the medical tradition of classical antiquity. Whilst the names of herbs have proved prone to change over time, their medicinal uses tend to remain remarkably constant over millennia.

Those with an interest in the history of plant medicines will thus find much to interest them in the contributions in this book. But it also illustrates that, when it comes to the history of herbs and healers, there is still much to do. Pharmaceutical historians have already made important contributions in this field, but there are many further insights they will be able to provide. **Stuart Anderson**

ISSN: 0079-1393 Indexed in Medline as Pharm. Hist. (Lond.)

Typeset and Produced by Ralph Allen Press Ltd, Bath BA1 3EN

https://doi.org/10.24355/dbbs.084-201802161454